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# REPORT OF THE AGRICULTURAL RESEARCH INSTITUTE OF ONTARIO

Markham, Ontario
March 31, 1992

The Honourable Elmer Buchanan
Minister of Agriculture and Food
Legislative Buildings
Toronto, Ontario
M7A 1A3

Dear Sir:

I have the honour to submit the twenty-ninth research Report of the Agricultural Research Institute of Ontario for the period April 1, 1991 to March 31, 1992.

The Institute wishes to express its sincere appreciation for the wholehearted cooperation of the administration and staff of the institutions at Alfred, Centralia, Guelph, Kemptville, New Liskeard, Ridgetown, Toronto and Vineland in the planning and execution of research programs in agriculture, veterinary medicine and consumer studies.

Respectfully submitted,

Harvey J. Brown
Chairman
Agricultural Research Institute of Ontario

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Guelph, Ontario
March 31, 1992

Mr. Harvey Brown
Agricultural Research Institute of Ontario

Dear Sir:

I submit herewith a report of the Ontario Ministry of Agriculture and Food's research programs in agriculture, veterinary medicine, and consumer studies for the year ending March 31, 1992.

Respectfully submitted

Norris W. Hoag
Director of Research
Agricultural Research Institute of Ontario

## THE AGRICULTURAL RESEARCH INSTITUTE OF ONTARIO

The Agricultural Research Institute of Ontario Act passed by the Provincial Legislature created the Institute in 1962 with the specific duties and responsibilities over the expenditure of the Ontario Ministry of Agriculture and Food's research funds for agriculture, veterinary medicine, and consumer studies. The ARIO meets every two months to review research programs, to inquire into whether or not they meet the needs of the industry, and to make recommendations to the Minister, where appropriate, on the expansion or reduction of programs and their human and physical resources.

The ARIO is composed largely of farmers and agribusiness people and its membership reflects the broadly based nature of Ontario's industry. The membership, of not more than fifteen, is appointed by the Lieutenant Governor in Council who also appoints the Director of Research from the Ministry.

Guided by the Act, Institute members believe their work is driven by this mission:

**To provide direction for research activities, in the pursuit of a competitive, economically viable and environmentally responsible agriculture and food system.**

Ten centres report to the ARIO: Agricultural and Food Laboratory Services, Alfred College of Agriculture and Food Technology, Centralia College of Agricultural Technology, Engineering Resources Unit, Policy and Progam Division, Horticultural Research Institute of Ontario, Kemptville College of Agricultural Technology, New Liskeard College of Agricultural Technology, Ridgetown College of Agricultural Technology, and University of Guelph. The seven experimental stations, Alma, Arkell, Cambridge, Elora, Guelph, Ponsonby, and Woodstock, are managed by the University under contract with the Ministry.

Under the Act, the Institute may accept donations and grants for research which are held in trust by the Director of Research and allocated for research in accordance with the terms of the funds. These funds are usually from commercial sources and are used for specific projects.

The ARIO is a unique corporate body responsible to the Minister of Agriculture and Food.

## MEMBERS OF THE AGRICULTURAL RESEARCH INSTITUTE OF ONTARIO

Harvey Brown, Chairman
Claire Belluz, Vice-Chairman
Norris Hoag, Director of Research
Betty Morgan, Comptroller
Margaret Roberts, Recording Secretary

Lynne Cohoe
Kenneth DeBoer
Eleanor Hart
John McDougall
Yvon Martel

Steffi Schwan
Tom Smyth
Gordon Strang
Mary Ellen Tyler
Deborah Whale

## REPORTING INSTITUTIONS

**ACAFT**

Alfred College of Agriculture & Food Technology
Collège de technologie agricole et alimentaire d'Alfred
P.O. Box 580
Alfred, Ontario
K0B 1A0

**AFLSB**

Agricultural and Food Laboratory Services Branch
259 Grange Rd.
P.O. Box 1030
Guelph, Ontario
N1H 6N1

**CCAT**

Centralia College of Agricultural Technology
Huron Park, Ontario
N0M 1Y0

**ERU**

Engineering Resources Unit
Resources Management Branch
P.O. Box 1030,
Guelph, Ontario
N1H 6N1

**HRIO**

Horticultural Research Institute of Ontario
Vineland Station, Ontario
L0R 2E0

**KCAT**

Kemptville College of Agricultural Technology
Kemptville, Ontario
K0G 1J0

**NLCAT**

New Liskeard College of Agricultural Technology
New Liskeard, Ontario
P0J 1P0

**PPD**

Policy and Programs Division
Ontario Ministry of Agriculture and Food
801 Bay Street, 4th Floor
Toronto, Ontario
M7A 2B2

**RCAT**

Ridgetown College of Agricultural Technology
Ridgetown, Ontario
N0P 2C0

**UG**

University of Guelph
Guelph, Ontario
N1G 2W1

# BUDGET

| 1991-1992 Research Funding | Ontario Government Funding $ | ARIO Trust Fund (actual expenditure) $ |
|---|---|---|
| Education & Research Division | 5,485,400 | ----- |
| Agricultural & Food Laboratory Services | 1,240,000 | ----- |
| Policy & Programs Division | 600,000 | ----- |
| University of Guelph | 29,340,100 | ----- |
| Horticultural Research Institute of Ontario | 4,871,085 | 504,025 |
| Alfred College of Agriculture & Food Technology | 71,000 | 116,050 |
| Centralia College of Agricultural Technology | 436,300 | 167,510 |
| Kemptville College of Agricultural Technology | 740,000 | 25,805 |
| New Liskeard College of Agricultural Technology | 1,450,200 | 24,090 |
| Ridgetown College of Agricultural Technology | 2,592,800 | 347,600 |
| **Special ARIO Trust Funds** | | |
| Red Meat Research Program | ----- | 32,620 |
| Ontario Pork Industry Improvement Plan | ----- | 700,030 |
| Agriculture & Food Research Fund | ----- | 956,630 |
| Land Stewardship | ----- | 501,830 |
| Food Systems 2002 -- Pest Management Research Program | ----- | 1,020,830 |
| Red Meat II Research Program | ----- | 1,915,430 |
| Ontario Food Processing Research Fund | ----- | 6,950 |
| **Total** | **46,826,885** | **6,319,400** |

## CONTENTS


Letter from the Chairman, ARIO ..... i

Letter from the Director of Research, ARIO ..... i

Chairman's Report ..... 1

Rapport du président de l'IRAO ..... 1

Report of the Director of Research ..... 7

Rapport du directeur de la recherche ..... 7


## INVENTORY OF AGRICULTURAL RESEARCH PROJECTS


Agricultural and Food Laboratory Services ..... 33

Alfred College of Agriculture and Food Technology ..... 34

Centralia College of Agricultural Technology ..... 34

Engineering Resources Unit ..... 35

Policy and Programs Division ..... 35

Horticultural Research Institute of Ontario ..... 36

Kemptville College of Agricultural Technology ..... 40

New Liskeard College of Agricultural Technology ..... 42

Ridgetown College of Agricultural Technology ..... 43

University of Guelph ..... 46

- Animal and Poultry Production & Health Management ..... 46
- Engineering for Animal and Crop Production ..... 52
- Field Crops ..... 53
- Horticultural Crops ..... 54
- Pest Management and Disease Control ..... 54
- Turfgrass ..... 55
- Honey & Pollination ..... 55
- Food ..... 55
- Pasture and Grazing Management ..... 56
- Soil, Water and Waste Management ..... 56
- Farm Management, Production Economics, Resources and Inputs ..... 57

Agriculture and Food Research Program ..... 58

Food Systems 2002 - Pest Management Research Program ..... 59

Land Stewardship Research Program ..... 60

Ontario Food Processing Research Fund ..... 61

Ontario Pork Industry Improvement Plan Research Program ..... 62

Red Meat II Research Program ..... 63

## BIBLIOGRAPHY


Agricultural and Food Laboratory Services ..... 66

Alfred College of Agriculture and Food Technology ..... 66

Centralia College of Agricultural Technology ..... 67

Horticultural Research Institute of Ontario ..... 68

Policy and Programs Division ..... 72

Kemptville College of Agricultural Technology ..... 73

New Liskeard College of Agricultural Technology ..... 74

Ridgetown College of Agricultural Technology ..... 74

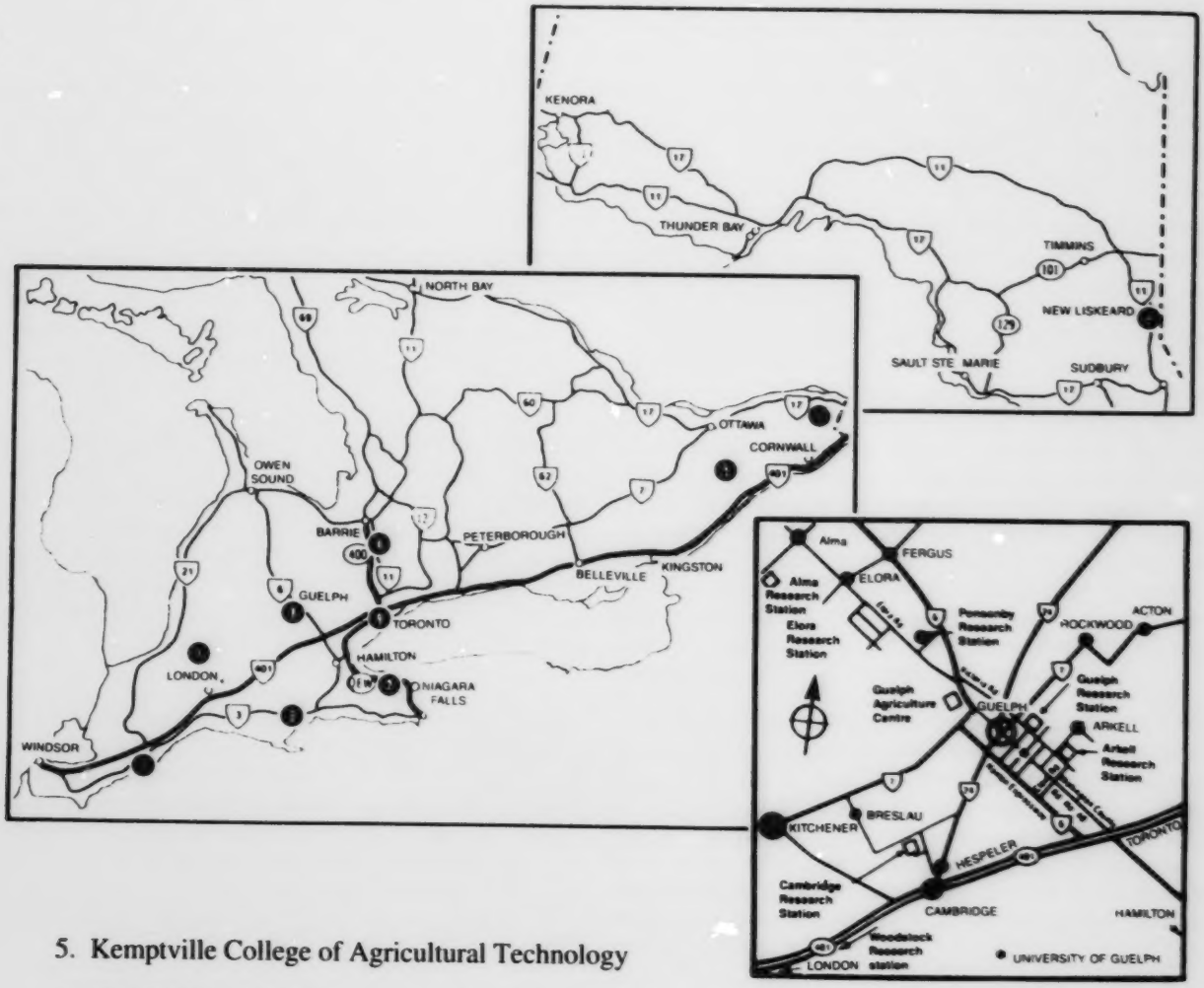
University of Guelph – Ontario Agricultural College ..... 78

- Beef ..... 78
- Dairy ..... 78
- Swine ..... 79
- Poultry ..... 81
- Engineering for Animal and Crop Production ..... 82
- Corn ..... 83
- Cereals ..... 83
- Forages ..... 84
- Pulses and Other Crops ..... 85
- Vegetables ..... 86
- Tree Fruits and Small Fruits ..... 86
- Ornamentals ..... 86
- Weeds ..... 86
- Insect Control ..... 87
- Plant Disease Control ..... 89
- Turfgrass ..... 90
- Honey and Pollination ..... 90
- Food ..... 91
- Pastures and Grazing Management ..... 92
- Agrometeorology ..... 92
- Water Management in Agricultural Watersheds ..... 92
- Agricultural Resources Inventory and Use ..... 92
- Soil & Water Management for Crop Production ..... 93
- Farm Management, Production Economics, Resources and Inputs ..... 94

University of Guelph – Ontario Veterinary College ..... 96

Equine Research Program ..... 100

1. Centralia College of Agricultural Technology
2. Horticultural Research Institute of Ontario, Vineland Station
3. Horticultural Experiment Station, Simcoe
4. Muck Research Station, Bradford




5. Kemptville College of Agricultural Technology
6. New Liskeard College of Agricultural Technology
7. Ridgetown College of Agricultural Technology
8. University of Guelph, and Agricultural and Food Laboratory Services (OMAF)
9. Policy and Programs Division (OMAF, Toronto)
10. Alfred College of Agriculture and Food Technology

## Chairman's Report

The fiscal year 1991-92 marks the thirtieth anniversary year of ARIO. We welcomed our new Director, Norris Hoag in August, and new members Mary Ellen Tyler, of Waterloo, and Ken DeBoer, of Lucknow in April, and Steffi Schwan, of Roslin in December. In February we wished "au revoir" to Bill Grieve of Dorchester, our previous chairman, and members Brian Schubert, of New Liskeard and Pat Wall, of Wellesley, with our sincere thanks for their tremendous contribution over the past six years.

Our activities this year included attending other research - related meetings. Five Institute members went to a national conference in Montreal in June, "Partnerships: A Focus on Technology", for the setting of national research priorities. Two main themes emerged - how research can be used to ensure competitiveness and the importance of getting research results to the potential user.

In October four members attended a follow-up meeting that was held in Mississauga to seek public opinion into developing a national research strategy. The attendees agreed that Canada must maintain or increase agricultural research. Because Canada will be competing in a larger market, competitiveness and market, value-added, marketing studies and partnerships/networks were mentioned most.

All ARIO members were invited and many attended the expanded annual meeting of the **Ontario Agricultural Services Coordinating Committee** in January 1992. The new format provided plenary and workshop sessions to which the agri-food industry, and agricultural organizations and associations were invited to send delegates. About 140 people attended, some being introduced for the first time to the process of co-ordination of agricultural research and services in Ontario.

In October we met with the Minister of Agriculture, the Honourable Elmer Buchanan. His Ministry's funding of $55 million demonstrates dedication to research, which is and will continue to be a high priority. He heartily endorsed ARIO's six priorities, saying that he counted on ARIO to provide advice, especially with changing rural communities and the need to adapt to the changes and shifts in agriculture. He would like to see greater private sector involvement through partnerships and consultation.

## Rapport du président

L'exercice 1991-1992 marque le trentième anniversaire de l'Institut de recherche agricole de l'Ontario (IRAO). Cet exercice coïncide avec l'arrivée de M. Norris Hoag comme nouveau directeur, en août dernier, ainsi qu'avec l'arrivée de trois nouveaux membres, M$^{me}$ Mary Ellen Tyler, de Waterloo, et M. Ken DeBoer, de Lucknow, en avril, et M$^{me}$ Steffi Schwan, de Roslin, en décembre. M. Bill Grieve, de Dorchester, ancien président, nous a quitté en février tout comme les membres suivants, soit M. Brian Schubert, de New Liskeard, et M. Pat Wall, de Wellesley. Nous les remercions sincèrement de leur précieux apport au cours des six dernières années.

Entre autres activités, nous avons cette année assisté à diverses rencontres ayant un lien avec la recherche. Cinq membres de l'Institut se sont rendus à Montréal en juin pour assister à une conférence nationale intitulée «Le partenariat : plaque tournante de la technologie» qui visait l'établissement de priorités nationales en matière de recherche. Cette conférence a permis de dégager deux grands thèmes : la façon dont la recherche peut contribuer à assurer notre compétitivité et l'importance de la communication des rapports de recherche aux utilisateurs potentiels. En octobre, quatre membres ont assisté à une rencontre post-conférence à Mississauga pour prendre le pouls de l'opinion publique avant que soit élaborée une stratégie nationale en matière de recherche. Les participants se sont dits d'avis que la recherche en agriculture au Canada doit se poursuivre et s'intensifier. Comme le Canada aura à se tailler une place sur un marché élargi, les débats ont surtout porté sur sa compétitivité, le marché, la valeur ajoutée, les études en commercialisation et les partenariats ou réseaux.

En réponse à une invitation lancée à tous les membres de l'IRAO, bon nombre ont assisté, en janvier dernier, à l'assemblée annuelle du **Comité ontarien de coordination des services agricoles** (COCSA), une assemblée de plus grande envergure qu'auparavant qui, dans sa nouvelle formule, comportait des séances plénières et des ateliers auxquels le secteur agro-alimentaire ainsi que les organisations et associations rurales avaient été invités à déléguer des représentants. Environ 140 personnes ont assisté à l'assemblée, certaines d'entre elles prenant part pour la première fois au processus de coordination de la recherche et des services agricoles en Ontario.

En octobre, nous avons rencontré l'honorable Elmer Buchanan, ministre de l'Agriculture. L'apport de 55 millions de dollars de son ministère démontre bien que la volonté d'investir dans la recherche est et demeurera une priorité. Le Ministre a chaleureusement appuyé les six objectifs prioritaires de l'IRAO, ajoutant qu'il comptait sur l'IRAO pour agir comme organisme-conseil, en raison surtout de l'évolution des collectivités rurales et de la nécessité pour les intervenants de s'adapter aux changements et à la mutation de

Deputy Minister, Rita Burak, joined us at the December meeting. She spoke briefly and fielded questions from members.

Our only tour of research facilities this year was to the new horticultural science greenhouses at the Bovey Building, University of Guelph.

Our publication, *Highlights of agricultural and food research in Ontario/Faits saillants en reserche agro-alimentaire en Ontario*, acquired its bilingual title starting with the March 1992 issue.

## Program reviews

The Institute reviewed ten research programs. Six of these were University of Guelph and OMAF programs in vegetables, fruits, ornamentals, food processing, agricultural water management, and soil and water management. The remaining four were University of Guelph programs in aquaculture, turfgrass, agrometeorology and agricultural land inventory and use. A new program, "Agriculture, Environment and the Stewardship of Natural Resources", was approved to replace the existing four U. of Guelph programs in land, soil and water. This new program will focus on environmental sustainability and the stewardship of natural resources by agriculture. The research will provide the framework for assessing the economic viability, the social impact and the environmental sustainability of existing farming systems and new management practices which are being developed.

Most programs were approved without extra funds because of current government restraints.

## Competitive Research Funds

Forty-eight proposals were received by mid-July for the new Food Processing Research Fund. Eighteen projects were approved totalling about $1.5 million. A second call for proposals went out in February.

In December a call for proposals went out under the Food Systems 2002 - Pest Management Research Program for one-year, cost-shared projects.

Another request for proposals under the Red Meat II Research Program went out in February concerning the beef industry and factors affecting its competitiveness. This would include studies

l'agriculture. Le Ministre a déclaré souhaiter une plus grande participation du secteur privé sous forme de partenariats et de services de consultation.

M^me^ Rita Burak, sous-ministre, s'est jointe à nous à la rencontre de décembre. Elle a prononcé une brève allocution et répondu aux questions des membres.

L'unique visite d'installations de recherche cette année a été celle des serres d'horticulture du pavillon Bovey à l'Université de Guelph.

Notre publication, *Highlights of agricultural and food research in Ontario/Faits saillants de la recherche agro-alimentaire en Ontario*, est, depuis le numéro de mars 1992, dotée d'un titre bilingue.

## Révision des programmes

L'Institut a revu dix programmes de recherche, dont six qui sont menés conjointement par l'Université de Guelph et le MAAO et qui portent sur les légumes, les fruits, la culture de plantes d'ornement, la transformation des aliments, la gestion des eaux agricoles, du sol et de l'eau, et quatre qui sont menés par l'Université de Guelph et qui portent sur l'aquaculture, la production de gazon, l'agrométéorologie ainsi que l'inventaire et l'utilisation des terres agricoles. Un nouveau programme sur l'Agriculture, l'environnement et la gestion des richesses naturelles a été approuvé pour remplacer les quatre programmes actuels de l'Université de Guelph sur les terres, le sol et l'eau. Ce nouveau programme sera axé sur la contribution de l'agriculture à un environnement durable et à la gestion des richesses naturelles. La recherche tracera un cadre propice à l'évaluation de la viabilité économique, de la portée sociale et de la compatibilité avec un environnement durable des systèmes d'exploitation actuels et des nouvelles pratiques de gestion préconisées.

Compte tenu des efforts de rationalisation des dépenses gouvernementales, la plupart des programmes ont été approuvés sans attribution de budgets supplémentaires.

## Fonds de recherche sur la compétitivité

Des 48 projets soumis à la mi-juillet dans le cadre du nouveau Fonds de recherche sur l'industrie de la transformation, 18 ont été retenus pour un total de 1,5 million de dollars. Un nouveau concours a été ouvert en février.

En décembre, un concours s'ouvrait pour des projets d'un an, avec participation financière, dans le cadre du Programme de recherche sur la lutte contre les ennemis des cultures — Production alimentaire 2002.

Un autre concours fut organisé en février, dans le cadre du programme de recherche Viande rouge II, pour des projets portant sur l'industrie de la viande rouge et les facteurs influençant son

and analyses on the various production practices and government support programs. Red Meat II continues until March 31, 1994. The Red Meat I Research Program ended on March 31, 1992.

The progress of other competitive research programs, namely Land Stewardship, and the Ontario Pork Industry Improvement Plan, was examined on a regular basis.

VMAP - Vegetation Management Alternatives Program - is a new competitive research fund. It came into effect January 31, 1992 between OMAF and the Ministry of Natural Resources, to fund research proposals that will lead to the reduction of dependence of herbicides in Ontario by improving the understanding of ecosystem processes and developing alternatives to herbicides.

## New or Improved Physical Facilities

Through the Anti-Recession Capital Program, intended to assist the construction sector of the provincial economy, needed improvements were realized. New Liskeard College of Agricultural Technology built a cow-calf barn, Alfred College of Agriculture and Food Technology an agronomy-greenhouse complex, and the Alma aquaculture research station had new laboratories added to its facilities.

## Research Priorities

Each year the Institute reviews and responds to the research recommendations from the Ontario Agricultural Services Coordinating Committee (OASCC). The research priorities established last year are still relevant for 1992-93. ARIO recommends that the Ministry of Agriculture and Food give high priority to these six key areas, listed in order of priority:

### • Agriculture and Environment Interaction

Maintaining natural resources and the quality of the environment is of paramount importance for plants, animals, and humans. Therefore, it is essential to conduct research leading to appropriate soil, water and air management and conservation, and to methods which prevent contamination or loss of these resources.

### • Optimal Economic Output

Optimal economic output is a concept that underlies both the competitiveness of a business and its sustained viability. This establishes its long-term survival as a business enterprise and as an

caractère concurrentiel. Ces projets peuvent prendre la forme d'études et d'analyses des différentes techniques de production et des programmes d'aide gouvernementaux. Le programme Viande rouge II se poursuit jusqu'au 31 mars 1994, le programme Viande rouge I ayant pris fin le 31 mars dernier.

Des évaluations périodiques ont été faites des progrès accomplis dans le cadre d'autres programmes de recherche sur la compétitivité, dont le Programme de gestion des terres et le Programme d'amélioration de l'industrie du porc de l'Ontario.

Un nouveau fonds de recherche sur la compétitivité a été créé le 31 janvier dernier. Il s'agit du Programme de recherche d'autres méthodes de gestion des végétaux, une initiative conjointe du MAAO et du ministère des Richesses naturelles qui assure le financement de projets visant la réduction de la dépendance à l'égard des herbicides en Ontario par une meilleure compréhension du fonctionnement de l'écosystème et l'élaboration de solutions de rechange.

## Installations nouvelles ou améliorées

Grâce au Programme antirécession — construction, destiné à aider le secteur de la construction de la Province, des améliorations qui s'imposaient ont pu être apportées. On a ainsi construit une étable destinée au naissage au Collège de technologie agricole de New Liskeard et un pavillon d'agronomie assorti d'une serre au Collège de technologie agricole et alimentaire d'Alfred. De plus, de nouveaux laboratoires sont venus s'ajouter aux installations existantes de la station de recherche aquacole d'Alma.

## Priorités en matière de recherche

Chaque année, l'Institut revoit et commente les recommandations du COCSA. Les priorités établies l'an dernier en matière de recherche ont été maintenues pour 1992-1993. L'IRAO recommande que le ministère de l'Agriculture et de l'Alimentation accorde un traitement prioritaire aux six secteurs clés suivants, lesquels sont énumérés par ordre de priorité :

### • Interaction de l'agriculture et de l'environnement

Le maintien des richesses naturelles et de la qualité de l'environnement est d'une importance capitale pour les plantes, les animaux et les humains. En conséquence, il est essentiel de mener des recherches débouchant sur des méthodes appropriées de gestion et de conservation du sol, de l'eau et de l'air ainsi que sur des méthodes propres à combattre la contamination ou la perte de ces richesses.

### • Rendement économique optimal

C'est sur le concept de rendement économique optimal que reposent la compétitivité d'une entreprise et sa viabilité. On doit donc considérer la survie à long terme de l'entreprise à la fois

integral part of the natural environment. This concept should be prominent in all research conducted in the agriculture and food sectors. Optimal economic output applies, whether research is conducted on plants, animals, natural and human resources, storage, or the entire food processing and retailing sector. At the same time, it is recognized that market, product and price risk are inherent and must be managed and accounted for at all levels of the food production, processing and distributing system.

comme entreprise commerciale et comme partie intégrante du milieu naturel. Ce concept devrait être omniprésent dans tous les travaux de recherche en agriculture et en alimentation, qu'il s'agisse de recherche sur les plantes, les animaux, les richesses naturelles, les ressources humaines, l'entreposage ou l'un ou l'autre des aspects du secteur de la transformation alimentaire et de la vente au détail. En même temps, on reconnaît l'existence des risques liés aux marchés, aux produits et aux prix et la nécessité de les gérer et d'en tenir compte à tous les niveaux de la production, de la transformation et de la distribution d'aliments.

- **Food Quality and Safety**

Consumers are increasingly conscious of the quality and safety of the foods they eat. When they buy food, they are interested in wholesomeness, nutrition, variety, convenience, and freshness. Improved production and control systems need to be developed to provide the level of confidence required. This relates to the development and implementation of appropriate production, processing, handling and quality/safety assurance practices throughout the agri-food industry.

- **Qualité et innocuité des aliments**

Les consommateurs se préoccupent de plus en plus de la qualité et de l'innocuité des aliments qu'ils consomment. Ils recherchent, dans leurs achats, des produits naturels, nutritifs, variés, pratiques et frais. Il faudrait mettre sur pied des systèmes de production et de contrôle améliorés si l'on veut être à la hauteur du niveau de confiance exigé. Cela suppose l'élaboration et la mise en oeuvre de pratiques appropriées en matière de production, de transformation, de manutention et de vérification de la qualité et de l'innocuité dans l'ensemble du secteur agro-alimentaire.

- **Animal Care**

Livestock producers and consumers are concerned with good animal care practices. Research in the areas of animal behaviour and care, which includes housing, handling management, transportation, and packing house facilities, is vital to the development of effective and realistic codes of practice. The transfer of this technology to producers is essential. Animal agriculture must continue to develop production systems that are productive and profitable, yet responsive to environmental and animal needs.

- **Traitement des animaux**

Les éleveurs et les consommateurs sont soucieux des soins donnés aux animaux. La recherche dans les domaines du comportement animal et des soins à donner aux animaux, au chapitre notamment du logement, de la manipulation, de la gestion, du transport et des abattoirs, est nécessaire à l'élaboration d'un code de déontologie efficace et réaliste. Le transfert de cette technologie aux producteurs est indispensable. La zootechnie doit continuer à élaborer des systèmes de production qui sont productifs et rentables et qui tiennent compte en même temps des besoins de l'environnement et de ceux des animaux.

- **Sustainability in the Rural Community**

Global economic pressures, a reconstituted rural population in which farmers form a minority, a weakening of local rural community agricultural and social infrastructures, concerns with the loss of prime agricultural farm land, as well as environmental degradation, are among factors which influence the well-being of rural communities. Sustainable rural development must balance these economic, social, and environmental factors. Research and extension efforts need to focus on: human resource development, information technology, economic and social infrastructures, work environments, rural income, employment and retraining systems.

- **Permanence de la collectivité rurale**

Les pressions économiques mondiales, la transformation de la population rurale au sein de laquelle les agriculteurs sont désormais minoritaires, l'affaiblissement des infrastructures sociales et agricoles régionales des collectivités rurales et les inquiétudes concernant la perte de territoire agricole de premier choix aussi bien que la dégradation du milieu comptent parmi les facteurs qui affectent le bien-être des collectivités rurales. Toute expansion rurale durable passe par l'équilibre de ces facteurs économiques, sociaux et environnementaux. Les efforts de recherche et les services de consultation doivent donc porter sur la formation des ressources humaines, la technologie de l'information, les infrastructures économiques et sociales, le milieu de travail, ainsi que l'emploi, le perfectionnement et le revenu en milieu rural.

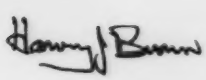
### • Consequences of New Technology

There are major issues confronting the food production and processing sectors. Any consideration of these issues, whether the environment, the safety and affordability of food, the well-being of the rural population, or animal care, reveals conflicting objectives and ideals. Serious study and research are required to find a basis for the resolution of these problems, the assessment, management and understanding of the risks associated with them, as well as the application of new technologies which would be ethically sound and scientifically grounded. Biological, social, ethical and economic factors must all be taken into account in the search for solutions and in the transfer of new technologies.

## Ontario Strategy for Agri-food Research

ARIO finalized its five-year research strategy for Ontario and presented it for discussion at the OASCC annual meeting in January. The Strategy will be reviewed annually. Copies may be obtained from the address printed on the back cover of this report.

Institute members are committed to ensuring that the resources available to agri-food research are used to the best possible advantage as we respond to current economic and social challenges.



H. J. Brown,
Chairman, ARIO

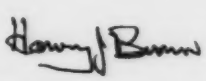
### • Conséquences des progrès technologiques

Les secteurs de la production et de la transformation alimentaire doivent faire face à des problèmes de taille. L'analyse de l'un ou l'autre de ces problèmes, qu'il s'agisse d'environnement, d'innocuité et de coût des aliments, de bien-être des populations rurales ou de santé animale, révèle des objectifs et des idéaux incompatibles. Des études et des recherches sérieuses s'imposent pour qu'on trouve des solutions à ces problèmes, qu'on évalue, gère et comprenne les risques qui y sont associés et qu'on assure que leur emploi respecte une certaine éthique et repose sur des bases scientifiques. Les facteurs biologiques, sociaux, éthiques et économiques doivent tous être pris en considération dans la recherche de solutions et dans le transfert de nouvelles technologies.

## Stratégie pour la recherche agro-alimentaire en Ontario

L'IRAO a formulé sa stratégie en matière de recherche pour les cinq prochaines années et l'a présentée à l'assemblée annuelle du COCSA en janvier dernier afin qu'un échange de points de vue puisse avoir lieu à ce sujet. Cette stratégie sera revue chaque année. On peut s'en procurer des exemplaires à l'adresse imprimée à la dernière page de couverture du présent rapport.

Les membres de l'Institut veillent à ce que le secteur de la recherche agro-alimentaire fasse le meilleur usage possible des ressources à sa disposition, tout en s'employant à relever les défis économiques et sociaux qui se présentent.



H.J. Brown, président l'IRAO

## Report of the Director of Research

The ARIO regularly reviews all research programs funded by the Ontario Ministry of Agriculture and Food. These programs cover a range of commodities and disciplines, touching all sectors of the agri-food system. With over one thousand projects at nine main facilities, the projects range in scope from basic to applied, current to leading-edge, thereby equipping the agriculture and food industry for today's and tomorrow's challenges.

Research at OMAF institutions is an ongoing process with significant accomplishments in most programs every year. It would be impractical in this report to describe in detail the progress of every project. It is, however, appropriate to highlight a few of the more significant advances. More information on the results may be obtained by contacting the research establishment directly.

## Rapport du directeur de la recherche

L'Institut de recherche agricole de l'Ontario (IRAO) réexamine périodiquement tous les programmes de recherche financés par le ministère de l'Agriculture et de l'Alimentation de l'Ontario (MAAO). Ces programmes portent sur toute une gamme de marchandises et de disciplines relevant de différents secteurs du domaine agro-alimentaire. Sur plus de mille projets menés dans neuf installations principales, les uns portent tantôt sur des notions fondamentales, les autres sur des techniques d'avant-garde, ce qui donne aux secteurs agricole et alimentaire les moyens de relever les défis d'aujourd'hui et de demain.

La recherche aux établissements du MAAO est un processus continu qui, chaque année, donne lieu à des réalisations importantes dans la plupart des programmes. Il serait difficile dans un rapport comme celui-ci de décrire en détail l'évolution de chaque projet. Il est cependant indiqué de souligner certains des progrès les plus marquants. Pour en savoir plus long sur les différents projets, il suffit de s'adresser directement aux divers établissements de recherche.

## Livestock and Poultry Production and Health Management

About 28% of the research effort and budget is devoted to animal research reflecting the size and importance of this segment of the industry to Ontario's agricultural economy.

Measurement of meat quality was an important aspect of beef research accomplishments. An optical scanner was used to measure the marbling and colour in beef steaks. Breed differences in tenderness, juiciness, and flavour were also found by a trained taste panel in a trial using bulls fed to just over a year of age. This work is being repeated for a variety of degrees of finish at market. (UG)

Nutritional programs for avoiding problems in stressed feeder calves showed that chelated chromium reduced the disease rate to 16.5 %, less than one-third of the control animals. Earliness of the chromium supplementation was a major factor in its effectiveness. Daily gain was increased 43% by chelated chromium during the initial 21 days on feed, although there was some compensatory gain in sick calves by day 35. Basic studies on aspirin to reduce stress were also conducted and showed an effect on prostaglandin synthesis which may in time affect the bovine respiratory disease complex. (UG)

## Élevage, aviculture et gestion sanitaire

Environ 28 % des efforts et du budget de recherche sont consacrés à la recherche en zootechnie, ce qui reflète l'importance et le poids de ce secteur d'activité dans l'économie agricole ontarienne.

Un aspect important des résultats de recherche sur le boeuf a trait à l'évaluation de la qualité de la viande. On a utilisé un lecteur optique pour mesurer le persillage et la couleur des steaks de boeuf. Un jury de dégustation compétent a de plus établi des distinctions de tendreté, de jutosité et de saveur entre les races au cours d'essais portant sur des taureaux engraissés jusqu'à un peu plus d'un an. On répète actuellement ces tests pour différents degrés de couverture au moment de la mise en marché. (UG)

Des programmes en nutrition visant à éviter les problèmes rencontrés chez les veaux d'engraissement soumis à un stress ont révélé que le chrome chelaté abaisse à 16,5 % l'incidence de la maladie, soit moins du tiers du groupe témoin. Les travaux ont montré que plus le chrome est administré tôt, plus son efficacité est grande. Grâce au chrome chelaté, le gain quotidien s'est accru de 43 % au cours des 21 premiers jours où il a été administré, bien qu'il y ait eu, à partir du jour 35, un certain rattrapage au niveau des gains de poids chez les veaux malades. Des études fondamentales sur la capacité de l'aspirine à réduire le stress ont également été menées et ont démontré un effet sur la synthèse de la prostaglandine qui peut, avec le temps, influencer le complexe de la broncho-pneumonie infectieuse enzootique. (UG)

Methods for including information on station-tested bulls into national genetic evaluations were developed. Heritabilities and genetic correlations obtained in experiments around the world were analyzed for differences according to breed, type of data (field or experimental), feeding regime and year of study. Breed significantly affected estimates for some traits, indicating that as more refined measurements became available in Ontario, breed specific values should be used in genetic evaluations and development of composite indexes. (UG)

Des méthodes ont été élaborées pour inclure les résultats des évaluations de taureaux en station dans des évaluations génétiques nationales. On a analysé les coefficients d'héritabilité et les corrélations génétiques obtenus dans des expériences menées un peu partout dans le monde afin de dégager des différences selon la race, le type de données (observations sur le terrain ou résultats d'expérience), le régime alimentaire et l'année de l'étude. Il ressort que l'évaluation de certains traits est fortement influencée par la race. Ainsi, à mesure que l'Ontario se dotera de méthodes de mesure perfectionnées, des valeurs propres aux différentes races devraient être utilisées dans les évaluations génétiques et l'élaboration d'indices composés. (UG)

Use of shredded paper as animal bedding has proven quite effective and economically attractive when compared to traditional straw and wood shavings. Paper is more absorbent than straw but results in less bedding compaction when used in combination with other bedding materials. Recycling paper as livestock bedding could reduce the paper going to garbage dumps by up to one-third. (KCAT)

L'utilisation du papier déchiqueté comme litière s'est avérée passablement efficace et intéressante sur le plan économique comparativement aux matériaux traditionnels que sont la paille et les frisures de bois. Le papier est plus absorbant que la paille, mais pour réduire le compactage de la litière, il est bon d'y adjoindre d'autres matériaux. L'utilisation du papier à recycler comme litière pour le bétail pourrait réduire jusqu'au tiers la quantité de papier déchargé dans les dépotoirs. (CTAK)

The health and productivity of the Ontario beef cow-calf herd was assessed, and the spreadsheet BEEFWATCH was developed to aid producers and veterinarians in monitoring production. (UG)

On a évalué la santé et la productivité du troupeau d'élevage de vaches allaitantes de l'Ontario et mis au point un chiffrier, «BEEFWATCH», pour aider les producteurs et les vétérinaires à surveiller la production. (UG)

A vaccine for pneumonic pasteurellosis was developed and licensed commercially. This was shown to be effective in the field when respiratory disease was prevalent. (UG)

On a découvert et fait breveter un vaccin contre la pasteurellose. Ce vaccin s'est révélé efficace sur le terrain là où la maladie respiratoire sévissait. (UG)

It was found that hidden carriers could harbour very harmful strains of *Haemophilus somnus*, and that certain *H.somnus* antigens had inhibitory effects on bone marrow. A method for *H.somnus* immunogen extraction was designed and scale-up for commercial vaccine production begun. (UG)

On a découvert que des vecteurs cachés pouvaient abriter des souches très dangereuses de *Haemophilus somnus* et que certains antigènes de *H. somnus* avait des effets inhibiteurs sur la moelle osseuse. On a mis au point une méthode d'extraction immunogénique du *H. somnus* qui a permis d'entreprendre des études en vue de la production d'un vaccin commercial. (UG)

Using a technology developed for rapid and accurate identification of verotoxigenic *E.coli* (VTEC) in meat, research revealed that contaminants of beef differ from bovine isolates, suggesting that contamination may occur during handling. (UG)

Grâce à une technique mise au point pour assurer l'identification rapide et précise de l'*E. coli* vérotoxigénique (VTEC) dans la viande, des recherches ont révélé que les contaminants de la viande de boeuf diffèrent des isolats bovins, ce qui laisse croire que la contamination peut survenir durant la manipulation. (UG)

One hundred beef calves treated with ivermectin (anthelmintic) prior to going on pasture showed sufficient improvement in weaning weights to cover costs of the treatment. The treatment was economic even with the very low worm counts measured in this trial. (NLCAT)

Cent veaux de boucherie traités à l'ivermectine (vermifuge antiparasitaire) avant d'être mis en pâturage ont affiché une amélioration des poids au sevrage suffisante pour compenser les coûts du traitement. Le traitement a été économique même pour la très faible numération de vers établie dans cette expérience. (CTANL)

Growing and finishing beef cattle performed well when fed alfalfa silage as the only roughage or in combination with corn silage. Gains on alfalfa silage were equal to gains on corn silage when energy levels were equalized. Alfalfa used to improve soil properties in intensive cash crop areas can be marketed through

L'élevage et l'engraissement des bovins de boucherie ont donné de bons résultats lorsque la luzerne ensilée a été employée comme seul fourrage ou en combinaison avec du maïs ensilé. Lorsqu'on a ajusté les niveaux d'énergie pour qu'ils soient identiques, on a obtenu les mêmes gains avec la luzerne ensilée qu'avec le maïs

growing and finishing cattle. (RCAT)

Assessment of the effects of the Somatic Cell Count (SCC) Penalty Program on SCC levels and measures of milk quality were completed. This resulted in a determination of which categories of Ontario dairy herds have the greatest impact on the provincial SCC, as well as identifying the target group necessary to decrease the level and keep it low. (UG)

The importance of scrubbing the teat end with an alcohol-soaked swab before dry cow treatment, for the prevention of new infections with Nocardia or Streptococcus uberis, was confirmed. (UG)

Research data were obtained that led to the construction of a portable, indirect calorimetry unit for measurement of energy balance for cattle, which permits easy assessment of energy values of feedstuffs. (UG)

Growth hormone treatment of cows over three consecutive lactations confirmed increased milk production by 10-20% over controls, without any significant effect on milk composition or somatic cell counts. Higher dosage levels tended to increase the incidence of mastitis. (UG)

It was determined that bovine conceptuses at 30 days gestation synthesized glycoprotein with similar properties to luteinizing hormone. This discovery could yield a blood test for detection of early pregnancy. (UG)

In testing a new approach to removing limiting amino acids from the diet of high producing cows, it appears that histidine is the first limiting amino acid, followed by leucine and valine. (KCAT)

Sixty dairy and beef heifers used on a rotational pasture grazing trial showed improved growth with high energy (barley) supplementation vs. high protein (soybean meal) supplementation. Protein supplementation did not offset costs; energy supplementation improved returns by $25.00 per head over 118 days. (NLCAT)

A four year study of the effects of stray voltage on lactating dairy cows, showed no significant effects on production parameters at the three levels of voltage studied (1.0, 2.5 and 5.0 volts). At the 5.0 volt level decreased water intake and feed consumption indicated that this voltage level could be starting to affect the cows. No significant behaviourial changes were measured at any voltage level. (NLCAT)

ensilé. L'élevage et l'engraissement des bovins permettent de commercialiser la luzerne utilisée pour améliorer les propriétés du sol dans les zones de culture commerciale intensive. (CTAR)

On a évalué l'influence du Programme de pénalité relatif au compte des cellules somatiques sur les niveaux de cellules somatiques et la qualité du lait. Cette étude a permis de déterminer les catégories de troupeaux laitiers de l'Ontario qui influencent le plus le compte de cellules somatiques de la Province, et d'identifier un groupe cible pour lequel le compte devrait être abaissé et maintenu à un bas niveau. (UG)

On a confirmé l'importance du nettoyage des trayons avec un tampon imbibé d'alcool avant le traitement des vaches sèches dans le but de prévenir de nouvelles infections au *Nocardia* ou au *Streptococcus uberis*. (UG)

On a recueilli des données qui ont mené à la construction d'une unité calorimétrique indirecte et portative destinée à mesurer l'équilibre énergétique chez les bovins, facilitant ainsi l'évaluation de la valeur énergétique des aliments. (UG)

L'administration d'hormones de croissance à des vaches pendant trois lactations consécutives a confirmé une augmentation de 10 à 20 % de la production de lait par rapport aux groupes témoins, sans qu'il n'y ait d'effet significatif sur la composition du lait ou le compte des cellules somatiques. Des doses plus élevées ont eu tendance à s'accompagner d'un plus grand nombre de mastites. (UG)

Il a été démontré que la glycoprotéine synthétisée de l'embryon bovin à 30 jours de gestation a des propriétés comparables à celles de l'hormone lutéinisante. Cette découverte pourrait conduire à un test sanguin de détection précoce de la gestation. (UG)

Il ressort de l'évaluation d'une nouvelle méthode de retrait des acides aminés limitants de l'alimentation des vaches à forte production de lait que l'histidine est le premier acide aminé limitant suivi de la leucine et de la valine. (CTAK)

Soixante génisses laitières et de boucherie ayant servi à une expérience de pâturage en rotation ont affiché une meilleure croissance avec des suppléments riches en énergie (orge) comparativement à des suppléments riches en protéines (tourteau de soya). Les suppléments de protéines n'ont pas permis de recouvrer les coûts engagés; les suppléments d'énergie ont amélioré les rendements de 25 $ par tête sur une période de 118 jours. (CTANL)

Une étude d'une durée de quatre ans des effets du courant vagabond sur les vaches laitières lactantes a indiqué que les trois niveaux de tension étudiés (1,0, 2,5 et 5,0 volts) n'ont aucun effet significatif sur les paramètres de production. À 5,0 volts, la diminution de la consommation d'eau et d'aliments est un indice que ce niveau de tension pourrait être celui à partir duquel les vaches commencent à réagir. Aucun des niveaux de tension n'a permis de

déceler de changement de comportement important. (CTANL)

Microbial phytase, an enzyme, was added to swine diets which obtained most of their phosphorus content from organic sources. This resulted in increased rate and efficiency of gain, increased digestibility of dietary phosphorus, and other improvements indicative of improved dietary phosphorus availability. The response to phytase was similar to that resulting from increasing inorganic dietary phosphorus. The enzyme decreased faecal phosphorus and thus potential phosphorus pollution of land and water. (UG)

On a ajouté une phytase microbienne, une enzyme, à l'alimentation des porcs dont le gros de la ration de phosphore provenait de sources organiques. On a noté un gain de poids plus rapide, un indice de conversion plus grand, une meilleure assimilation du phosphore contenu dans les aliments et d'autres améliorations révélatrices d'une meilleure disponibilité du phosphore d'origine alimentaire. La réaction à la phytase a été semblable à celle produite par un apport accru de phosphore inorganique dans l'alimentation. L'enzyme abaisse le taux de phosphore présent dans les fèces et diminue de ce fait le taux de pollution des terres et de l'eau. (UG)

Further validation work on the assay for boar taint was carried out using 10 trained judges to evaluate loin chops. Samples were rated for off-aroma, off-flavour, pork flavour, softness and tenderness and a fry test was performed by three experienced testers on the fat samples from all animals. Androst-16-ene steroid levels in salivary glands were associated with off-flavour and off-aroma sensory scores. (UG)

D'autres travaux visant à confirmer la bioanalyse de l'odeur sexuelle furent entrepris avec le concours de 10 juges compétents qui, à partir d'échantillons de longe de porc, durent se prononcer sur l'absence de défaut sexuel dans l'odeur et le goût de la viande, ainsi que sur la saveur, la fermeté et la tendreté du porc. Trois évaluateurs d'expérience ont effectué une épreuve de cuisson des échantillons de gras prélevés sur chacune des carcasses. La présence du stéroïde Androst-16-ene dans les glandes salivaires a été associée à l'absence de défaut sexuel de la viande, tant au niveau de l'odeur que du goût. (UG)

Contemporary crates for farrowing sows are sharply criticized by animal welfarists because they severely restrict bodily movement of the dam, do not permit free access to piglets at all times and frustrate such maternal instincts as nest building and nest maintenance. An experiment has been conducted during the past year using a circular crate design, in which the sow is able to turn around freely and have unrestricted visual contact with piglets at every part of the farrowing unit. The overall floor area required for the circular crate is similar to the traditional rectangular crate. Sows housed in circular crates spend more time feeding and drinking and rest more frequently in a comfortable lateral position than those in rectangular crates. Piglets move about more and the deaths prior to weaning were less in circular crates. Based on the above favourable data, a larger full scale project is being undertaken at the Arkell Swine Research Centre. (UG)

Les cages actuelles pour les truies allaitantes sont vivement critiquées par les regroupements voués à la protection des animaux du fait que ces cages restreignent beaucoup les mouvements de la mère, ne permettent pas aux porcelets d'y accéder en tout temps et frustrent les instincts maternels d'aménagement et d'entretien du nid. Une expérience a été menée au cours de l'année écoulée pour étudier une cage circulaire dans laquelle la truie est à même de se retourner librement et de conserver un contact visuel avec ses petits dans tous les points de la cage. La superficie globale de la cage circulaire est semblable à celle de la cage rectangulaire traditionnelle. Les truies logées dans des cages circulaires passent plus de temps à se nourrir et à boire et se reposent plus souvent dans une position latérale confortable que dans les cages rectangulaires. Dans les cages circulaires, les porcelets se déplacent davantage et les décès avant le sevrage sont moins nombreux. Compte tenu de ces résultats positifs, un projet de plus grande envergure est actuellement en cours au «Arkell Swine Research Center». (UG)

Studies were carried out on producing leaner pork more efficiently. High levels of feed intake during the finishing phase of growth are commonly associated with accelerated fat buildup and a lessening of feed/gain ratio. The action of porcine somatotropin (pST) led to an improvement in feed/gain ratio since less energy from the diet is required to deposit 1 kg of lean than is required for 1 kg of fat deposit. The 22% reduction in feed/gain ratio realized by the use of long-term pST implant in the present study is similar in size to those previously reported for pigs that received daily pST injections. (UG)

Des études ont été entreprises en vue d'atteindre une efficacité accrue dans la production de porcs plus maigres. Une prise alimentaire considérable au cours de la phase d'engraissement est souvent associée à une accumulation accélérée de gras et à une diminution de l'indice de conversion. L'action de la somatotropine porcine (pST) a conduit à une amélioration de l'indice de conversion puisqu'il faut moins d'énergie alimentaire pour produire 1 kg de viande maigre qu'il n'en faut pour produire 1 kg de gras. La diminution de 22 % de l'indice de conversion obtenue dans cette étude par l'utilisation d'implants de pST correspond aux résultats obtenus antérieurement avec des injections quotidiennes de pST. (UG)

A test has been developed to identify a gene mutation associated with Porcine Stress Syndrome (PSS). This resulted from a research effort involving the University of Toronto and the Ontario Veterinary College. (UG)

*Leptospira bratislava* has been identified as a cause of abortion in Ontario swine and a serum test has been developed to identify herds where the disease is present. (UG)

An ELISA (enzyme-linked immunosorbent assay) test has been developed which will identify swine herds infected with *Actinobacillus pleuropneumoniae*. In addition, improved vaccines are being developed as a result of research into the production of disease by *A. pleuropneumoniae*. (UG)

An alternative housing system has been developed for breeding and gestating sows which addresses several of the serious limitations of existing intensive sow accommodation methods. This system utilizes modern computer technology to allow group housing and socially coordinated feed intake and resting, while also permitting individual control of feed intake. Sows adapted quickly to the new system, and improvements were noted in productivity, health and well-being of the animals housed in this system compared to conventional individual sow confinement systems. (RCAT)

Emphasis on nutrition of laying hens has shifted towards efficiency of feed utilization. Research suggests that it is possible to feed less crude protein and more synthetic amino acids, thus improving feed use while at the same time reducing nitrogen excretion rates. (UG)

Studies on the levels of dust and certain gases in commercial egg production units have confirmed that, during the winter, respirable dust, carbon dioxide and ammonia all exceed levels deemed normally acceptable. Dust in a research aviary at Arkell was 10 times that noted in a comparable cage unit, but carbon dioxide and ammonia were at acceptable levels. (UG)

There has been a trend in recent years to move from traditional incandescent lighting for poultry to fluorescent lighting which is much more energy efficient. A collaborative study with Ontario Hydro was designed to determine whether laying hens have a strong dislike for the flicker of fluorescent lights. Given a choice, the birds spent on average 73.2% of their time under fluorescent light and only 26.8% under incandescent light. The birds performed all activities in both types of light. These results indicate that the birds either did not perceive the flicker of the fluorescent lights, or perceived the flicker and did not find it unacceptable, and that they found some aspect of the fluorescent light more attractive than incandescent. (UG)

Au terme d'une recherche à laquelle ont participé l'Université de Toronto et le Ontario Veterinary College, on a mis au point un test permettant d'identifier une mutation génétique associée au syndrome du porc stressé (SPS). (UG)

On a identifié le *Leptospira bratislava* comme cause d'avortement spontané chez les porcs de l'Ontario. Un test sanguin a été mis au point pour identifier les troupeaux où sévit la maladie. (UG)

On a élaboré un test ELISA (test immuno-enzymatique) qui identifie les troupeaux de porcs infectés par l'*Actinobacillus pleuropneumoniae*. De plus, grâce aux recherches menées sur la pleuropneumonie à *Actinobacillus*, on travaille actuellement à la production de vaccins améliorés. (UG)

On a conçu, à l'intention des truies mises à la reproduction et des truies en gestation, un nouveau système de logement qui vient régler plusieurs des problèmes que posent les systèmes de logement actuels. Ce nouveau système, qui s'appuie sur l'informatique, vise à permettre le logement en groupes et la coordination de la prise alimentaire et du repos tout en assurant un contrôle individuel de la prise alimentaire. Les truies se sont adaptées rapidement au nouveau système. On a noté des améliorations sur le plan de la productivité, de la santé et du bien-être des animaux logés dans ce système comparativement aux logements en bâtiments clos traditionnellement réservés aux truies. (CTAR)

Les chercheurs s'intéressent désormais davantage à l'indice de conversion qu'à l'alimentation proprement dite des pondeuses. Les recherches ont montré qu'il est possible de donner moins de protéines brutes et plus d'acides aminés synthétiques, ce qui améliore l'alimentation tout en réduisant les taux d'excrétion azotée. (UG)

Des études sur les niveaux de poussière et de certains gaz dans les installations de production commerciale d'oeufs ont confirmé que l'hiver, les poussières inhalables, l'anhydride carbonique et l'ammoniac dépassent les niveaux normalement acceptables. Le niveau de poussière dans un poulailler de recherche à Arkell était 10 fois supérieur à celui d'une installation comparable, mais les niveaux d'anhydride carbonique et d'ammoniac y étaient cependant acceptables. (UG)

On a assisté, ces dernières années, à une utilisation accrue de l'éclairage fluorescent, moins énergivore, au détriment de l'éclairage incandescent traditionnel. Une étude a été menée conjointement avec Hydro Ontario pour déterminer si le scintillement de l'éclairage fluorescent incommodait beaucoup les pondeuses. Libres d'aller sous l'un ou l'autre éclairage, les poules ont passé en moyenne 73,2 % du temps sous l'éclairage fluorescent et seulement 26,8 % du temps sous l'éclairage incandescent. Sous les deux sortes d'éclairage, elles ont poursuivi toutes leurs activités. Ces résultats indiquent que les poules ne perçoivent pas le scintillement de l'éclairage fluorescent ou, si elles le perçoivent, qu'elles n'en souffrent pas et que, sous certains aspects, elles

préfèrent l'éclairage fluorescent à l'éclairage incandescent. (UG)

A recombinant baculovirus expressing the haemagglutin-neuraminidase gene of Newcastle disease virus was tested as a sub unit vaccine for Newcastle disease in poultry. The vaccine was effective as a conventional inactivated Newcastle disease virus vaccine. (UG)

Un baculovirus recombinant reproduisant le gène hémagglutinine-neuraminidase du virus de la maladie de Newcastle a été mis à l'essai comme vaccin de subunité contre la maladie de Newcastle chez les volailles. Le vaccin a été efficace comme vaccin conventionnel à virus inactivé contre la maladie de Newcastle. (UG)

Work on cardiovascular disease in turkeys has shown that turkeys have "outgrown" their cardio-pulmonary system. Slowing growth will reduce the high mortality in male turkeys. (UG)

Les travaux portant sur les maladies cardio-vasculaires chez les dindes indiquent que cet oiseau a «dépassé» son système cardio-pulmonaire. Le ralentissement de la croissance réduira le taux élevé de mortalité chez les dindons. (UG)

The first lambs in North America resulting from *in vitro* fertilization were born. (UG)

Naissance des premiers agneaux reproduits par fertilisation *in vitro* en Amérique du Nord. (UG)

A three breed rotational crossbreeding system for sheep has been expanded to produce nine different genotypes of lambs. Suffolk lambs grow faster than Romanov - Suffolk crosses, which grow faster than Romanov. Feed efficiency, ewe fertility and carcass characteristics are being compared, in cooperation with the U. of G. (NLCAT)

Un système de croisement reposant sur une rotation de trois races de moutons a été élargi afin de produire neuf différents génotypes d'agneaux. Les agneaux Suffolk se développent plus rapidement que le croisement Romanov-Suffolk, qui, à son tour, croît plus rapidement que le Romanov. L'indice de conversion, la fertilité des brebis et les caractéristiques des carcasses font l'objet d'une étude comparative, en collaboration avec l'Université de Guelph. (CTANL)

## Equine

The death of an embryo in very early pregnancy is a problem faced by all sectors of the equine industry involved in the breeding of horses. Studies have shown that early embryo death is more likely to occur in young mares than older mares, and in mares which are bred on their first estrus cycle after foaling (i.e. their "foal heat"). (UG)

## Équidés

La perte d'un embryon au tout début de la gestation est un problème auquel sont confrontés tous les secteurs d'activité intéressés à la reproduction des chevaux. Les études indiquent que le décès précoce d'un embryon est plus fréquent chez les jeunes juments et chez les juments qui sont fertilisées à leur premier cycle oestral après la mise bas. (UG)

**Mare and foal** **Jument et son poulain**

## Aquaculture

Nutrition studies determined the required level of the amino acid, methionine, in fish diets. As well, several chemical esters of vitamin C were evaluated, and compared to standard ascorbic acid formulations now in use. These new products may now be used in the diet with confidence in their ability to extend the shelf-life of feed, without sacrificing the chemical activity of this essential vitamin. (UG)

## Aquaculture

Grâce à des études en nutrition, on connaît maintenant la teneur que les rations données aux poissons doivent avoir en méthionine, un acide aminé. On a par ailleurs évalué plusieurs esters chimiques de la vitamine C et on les a comparés aux formules d'acide ascorbique standard actuellement utilisées. Il est maintenant possible d'intégrer ces nouveaux produits aux rations en ayant la certitude qu'ils contribuent à prolonger la fraîcheur des aliments sans nuire à l'activité chimique de cette vitamine essentielle. (UG)

Comparisons made of several strains of domestic rainbow trout can be used to help select the best strain for commercial purposes. Genetic studies also showed that several local strains of trout were related to each other. This information is useful in developing new breeding programs as well as measuring the effects of ongoing, farm level selection. (UG)

Des études comparatives de plusieurs lignées de truites arc-en-ciel d'élevage peuvent servir à sélectionner les lignées les meilleures pour des fins commerciales. Des études génétiques ont de plus révélé que plusieurs lignées locales de truites sont apparentées. Cette information est utile à l'élaboration de nouveaux programmes d'amélioration génétique ainsi qu'à l'évaluation des effets de la sélection suivie en pisciculture. (UG)

A fish-specific growth hormone assay was established. This will permit accurate measurement of the growth regulation in rainbow trout with respect to various feeding regimes and the stocking density. Genetic research significantly improved the procedures for extremely low temperature storage of fish semen, bringing closer the full commercialization of this technology. (UG)

Une bioanalyse d'une hormone de croissance propre aux poissons a été effectuée. Elle conduira à une évaluation précise de la régulation de la croissance chez les truites arc-en-ciel lorsque celles-ci sont soumises à différents régimes alimentaires et à diffrentes densités d'empoissonnement. Les recherches en génétique ont grandement amélioré les méthodes d'entreposage de la semence à des températures extrêmement basses, ce qui représente un pas de plus vers la commercialisation complète de cette technologie. (UG)

## Bees and Pollination

The objective of the breeding program is to produce bee strains resistant to both tracheal and Varroa mites. (UG)

## Abeilles et pollinisation

L'objectif du programme de reproduction est de créer des lignées d'abeilles résistantes aux acariens et au varroa. (UG)

## Agricultural Engineering

Engineering research focused on livestock housing, sprayer technology, and the storage, utilization and disposal of crops and agricultural by-products.

## Génie agricole

Les recherches dans ce domaine ont été axées sur le logement du bétail, les techniques de pulvérisation ainsi que sur l'entreposage, l'utilisation et l'élimination des cultures et des sous-produits agricoles.

Field studies at Vineland Station during the summer of 1991 investigated the "warming" and "re-warming" of peaches by monitoring their internal temperatures from before picking until after they were packed. Results showed that considerable warming and pre-warming can occur and that growers need to: pick as early in the morning as practical; keep fruit shaded after harvest; and minimize the time that fruit is out of cold storage after it is cooled. These steps will save growers money during cooling operations and prolong the product's shelf-life. (HRIO)

Au cours de l'été 1991, à la station de Vineland, le réchauffement, parfois répété, des pêches au cours de la cueillette et du conditionnement a fait l'objet d'essais sur le terrain. On a noté la température interne des pêches à plusieurs reprises entre le moment précédant immédiatement la cueillette et celui qui suit l'emballage des fruits. Les résultats indiquent qu'un réchauffement important peut se produire aussi bien avant que pendant la cueillette et que les producteurs devraient : effectuer la cueillette aussitôt qu'ils le peuvent le matin; garder les fruits à l'ombre après la cueillette; et laisser les fruits le moins longtemps possible hors des entrepôts frigorifiques une fois qu'ils ont été refroidis. Ces étapes permettront aux producteurs de réduire leurs frais de réfrigération et de prolonger la durée de conservation du produit. (IRHO)

Five kilowatt construction heaters are popular for small livestock rooms, but are often oversized leading to high demand loads and electrical failure. A cooperative project is investigating the use of heating cable hung in the room as an alternative to fan forced heaters. A prototype has operated successfully for over a year in a weaner room and has recently received CSA approval. ( UG/ERU)

Les radiateurs de chantier de cinq kilowatts utilisés dans les installations d'élevage fermier sont souvent trop puissants et demandent un surplus de courant qui peut causer des pannes d'électricité. Un projet conjoint étudie actuellement l'utilisation de câbles chauffants suspendus en remplacement des pulso-radiateurs. Un prototype qui fonctionne avec succès depuis plus d'un an dans

un local de sevrage a récemment été approuvé par l'ACNOR. (UG-Service du génie agricole)

After four years of wind tunnel studies and computer work, NatVent, the natural ventilation software package for livestock housing is ready. NatVent provides information on the preferred orientation and expected level of satisfaction for any naturally ventilated building. The software can consider local historical weather data for 32 sites across Canada. (ERU)

Après quatre années de recherche mettant à contribution l'informatique et les techniques de simulation dans des tunnels aérodynamiques, NatVent, le progiciel de ventilation naturelle pour les bâtiments destinés au bétail, est au point. NatVent fournit des renseignements sur l'orientation recommandée et le niveau de satisfaction à prévoir de tout bâtiment ventilé naturellement. Ce logiciel tient compte des données météorologiques historiques propres à 32 emplacements au Canada. (Service du génie agricole)

A fully automated system has been developed in-house to monitor and provide feedback control of levels of oxygen and carbon dioxide for a storage research facility. Very accurate and consistent environments can now be maintained so that controlled atmosphere (CA) experiments using relatively close levels of oxygen and carbon dioxide can be compared. This advancement of CA technology will assist researchers in applying CA storage to other horticultural crops, thereby increasing storage life. (HRIO)

Un système entièrement automatisé, de conception maison, surveille et contrôle les niveaux de $O_2$ et de $CO_2$ dans une installation de recherche sur l'entreposage. On peut maintenant garder des conditions très précises et très constantes, ce qui permet de comparer des expériences menées en atmosphère contrôlée (AC) à des niveaux de $O_2$ et de $CO_2$ très voisins. Ce progrès dans la technologie de l'AC permettra aux chercheurs d'appliquer les données sur l'entreposage en AC à diverses cultures horticoles dans le but d'accroître les durées de conservation. (IRHO)

Wind tunnel testing of spray patterns from various nozzle configurations showed significant variations from static tests. Considerable testing is needed to predict the effect of wind direction and speed upon pesticide targeting. (RCAT)

Des essais en tunnels aérodynamiques sur la répartition des produits pulvérisés au moyen de diverses buses montrent des écarts importants par rapport aux essais statiques. Il reste encore de nombreux essais à effectuer avant d'être en mesure de prévoir l'effet de la direction et de la vitesse du vent sur la trajectoire des pesticides. (CTAR)

## Field Crops

## Grandes cultures

A major component of Ontario agriculture and, consequently, OMAF research is a broad range of crops for both animal and human consumption.

Une composante majeure de l'agriculture ontarienne et, conséquemment, de la recherche au MAAO, est une grande variété de cultures pour la consommation animale et humaine.

Research established that the 2.6% genetic yield improvement achieved through corn hybrid development in recent decades was accompanied by improved adaptation to low nitrogen availability and improved tolerance to weed competition. These results indicate that modern corn hybrids utilize available (or applied) nitrogen fertilizers more efficiently and are less dependent on chemical or mechanical weed control than previous corn varieties. (UG)

Les recherches ont permis d'établir que l'amélioration génétique du rendement de 2,6 % obtenue grâce à la création d'hybrides du maïs au cours des dernières décennies s'est accompagnée d'une meilleure adaptation à la faible biodisponibilité de l'azote et d'une plus grande tolérance à la concurrence exercée par les mauvaises herbes . Ces résultats indiquent que les nouveaux hybrides du maïs assimilent plus efficacement l'azote biodisponible (ou épandu) et qu'ils exigent moins de désherbage chimique ou mécanique que les variétés de maïs précédentes. (UG)

In a three-year project, 200 hybrids were evaluated for a number of grain quality parameters of importance for food-use grain corn. Results indicated that modern hybrids have improved physical characteristics (kernel density and test weight) and tend to have higher protein content and lower planting rates. Some minor elements (copper, manganese, and selenium) were slightly lower in grain of modern hybrids. Kernel breakage and protein content were influenced more by genetic differences and drying temperature than field management factors. Finally, the results indicate that several hybrids adapted to 3,000+ heat unit areas are capable of meeting the

Dans le cadre d'un projet triennal, on a évalué 200 hybrides selon un certain nombre de critères de qualité importants pour le maïs-grain destiné à la consommation humaine. Les résultats montrent que les nouveaux hybrides présentent des caractéristiques physiques améliorées (densité du grain et poids spécifique), que leur teneur en protéines a tendance à être plus élevée et leurs densités de plantation, plus faibles. Le grain des nouveaux hybrides a une teneur légèrement moins élevée en certains oligo-éléments (cuivre, manganèse, sélénium). Le bris du grain et sa teneur en protéines

quality criteria of corn snack food processing companies in Canada. (UG)

Soil physical property improvements followed a pattern similar to soil organic matter, both improving with increased forage legume and cereal components in corn crop rotations, and with chisel ploughing (compared to moldboard ploughing). (UG)

The corn program gained support for registration of a new OMAF Hybrid: G8WC273 with a yield index of 118%. It was supported for registration by the Ontario Corn Committee for the short-season areas of Ontario. Its anticipated release is in 1992. (UG)

Five modern commercial corn hybrids rated at 3100 CHU were tested at four plant populations ranging from 26,000 to 38,000 plants per acre and at row spacings of 19, 30 and 38 inches. Initial results from year one of a three year study favoured 34,000 plants per acre at the 19 inch spacing. (RCAT)

The following cereal varieties were developed, registered and/or released:

Zavitz Winter Wheat: registered 1991 on recommendation of the Ontario Cereal Committee as a soft white winter wheat with excellent performance quality in Ontario. (UG)

CODAC Barley: supported for registration by the Ontario Cereal Crops committee; adapted to Ontario barley production areas; co-developed with the Crop Development Centre in Saskatoon. (UG)

The cereal program was successful in producing the world's first green wheat plants from mechanically-isolated wheat microspores and has achieved embryogenic frequencies averaging nearly one recovered plant per cultured-anther-equivalent. Refinement of these techniques may lead to efficient transformation protocols for wheat within the next 12-24 months. (UG)

Cereal research appears to have successfully transferred powdery mildew resistance from *Hordeum bulbosum*. *H. bulbosum* DNA transfer, to barley has been confirmed by southern RAPD (rapid amplified polymorphic DNA) analyses (another world-first). This breakthrough may lead to improved pesticide-free disease control in barley. (UG)

découlaient davantage des différences génétiques et de la température de séchage que de facteurs inhérents à la gestion des cultures. Enfin, les résultats indiquent que plusieurs hybrides adaptés à 3000 unités thermiques et plus respectent les critères de qualité exigés par les entreprises canadiennes de transformation du maïs en produits destinés aux collations. (UG)

Le fait d'intégrer dans la culture du maïs une rotation accordant une place accrue aux céréales et aux légumineuses fourragères et de travailler le sol au chisel plutôt qu'au moyen de la charrue à versoirs enrichit le sol de matières organiques et améliore du même coup ses propriétés physiques. (UG)

Le programme de maïs a reçu l'appui nécessaire pour permettre l'enregistrement d'un nouvel hybride du MAAO : G8WC273 à indice de rendement de 118 %. Le Comité ontarien du maïs a appuyé cet enregistrement pour les zones de l'Ontario où la saison de croissance est courte. La mise en vente est prévue pour 1992. (UG)

Cinq nouveaux hybrides commerciaux du maïs, cotés à 3 100 unités thermiques maïs ont été mis à l'essai selon quatre densités de plantation différentes allant de 26 000 à 38 000 plants à l'acre et des espacements entre les rangs de 19, 30 et de 38 pouces. Les résultats initiaux pour la première des trois années de l'étude favorisent une densité de 34 000 plants à l'acre et un espacement de 19 pouces. (CTAR)

Les variétés suivantes ont été produites et enregistrées ou mises en marché :

Blé d'automne Zavitz : enregistré en 1991 sur la recommandation du Comité ontarien des céréales comme blé d'automne *soft white* à qualité de rendement excellente en Ontario. (UG)

Orge CODAC : endossée par le Comité des cultures céréalières de l'Ontario; adaptée aux zones productrices d'orge de l'Ontario; élaborée conjointement avec le Centre d'amélioration des cultures de Saskatoon. (UG)

Dans le cadre du programme de céréales, on a réussi à produire les premiers plants de blé vert à partir de microspores de blé isolés mécaniquement, et à atteindre des fréquences embryogéniques moyennes de près d'un plant récupéré par équivalent de culture d'anthères. Le perfectionnement de ces techniques pourrait, d'ici 12 à 24 mois, mener à des protocoles de transformation efficaces du blé. (UG)

Les recherches sur les céréales semblent avoir permis de transférer avec succès la résistance au blanc du *Hordeum bulbosum*. Le transfert de l'ADN du *H. bulbosum* à l'orge a été confirmé par les analyses du *RAPD* (*rapid amplified polymorphic DNA*) (une autre première mondiale). Cette percée pourrait mener à des méthodes plus efficaces pour lutter contre les maladies de l'orge sans recourir aux pesticides. (UG)

A co-operative study over four years at Harrow and Ridgetown showed that the conventional 20 cm row spacing for soft white winter wheat gave equal yields when compared to the 10 cm spacings which have been found to increase yields in many parts of Europe and the USA. (RCAT)

Alsike clover studies found a general lack of persistence across the province resulting in the deletion of alsike from Field Crop Recommendations. (KCAT)

Alfalfa variety evaluation has added quality testing as a new measure of performance. Forage persistence is the prime concern throughout the variety testing program. (KCAT)

Completed field crops projects include a study on red clover seed production in northern Ontario, the response of barley and alfalfa to phosphorus and *Penicillium bilaji*, and the investigation on the establishment, growth and erosion control potential of certain tree and shrub species on gully and stream banks. Results of many years of nitrogen work with canola will soon be incorporated into revised provincial recommendations. Mechanical weed control methods were evaluated relative to herbicides on five crop species. (NLCAT)

Advances in research on artificial seeds have enhanced the vigour and performance of alfalfa dry somatic embryos, and these will serve as the prototype to be used in commercial alfalfa breeding. (UG)

Transgenic or genetically engineered alfalfa plants have exhibited enhanced tolerance of freezing temperatures and flooding in laboratory trials. This is the first demonstration of the feasibility of improving winterhardiness through genetic engineering. This year, field tests have been proposed to determine the effects of these transformations on the persistence and longevity of alfalfa stands during actual Ontario winters. (UG)

Forage and turf seed production trials indicated that Ontario has potential for a profitable grass seed production sector. Ontario trials involving perennial ryegrass, tall fescue, Kentucky bluegrass, bentgrass, hard fescue, and Chewings fescue all provided yields competitive with current seed production areas. (UG)

Procedures have been developed to assess and screen for post-ensiling quality in alfalfa breeding populations based on

Une étude conjointe d'une durée de quatre ans à Harrow et à Ridgetown a indiqué que l'espacement habituel de 20 cm entre les rangs de blé d'automne *soft white* donne les mêmes résultats que l'espacement de 10 cm auquel on a attribué des augmentations de rendement dans maintes régions de l'Europe et des États-Unis. (CTAR)

Des études sur le trèfle d'alsike ont permis de constater un manque général de persistance, partout dans la province, depuis que cette culture ne figure plus dans les Recommandations sur les grandes cultures (CTAK)

L'évaluation des variétés de luzerne comporte dorénavant des essais axés sur la qualité comme nouvelle mesure de la performance. La persistance des cultures fourragères était au premier rang des préoccupations au cours du programme d'essais de variétés (CTAK).

Les projets menés à bien comprennent une étude sur la production de semences de trèfle rouge dans le nord de l'Ontario, la réponse de l'orge et de la luzerne au phosphore et à Penicillium bilaji, et une étude sur l'établissement de certaines espèces d'arbres et d'arbustes sur les berges de ravins et de cours d'eau, leur croissance et leur rôle anti-érosion. Les résultats de nombreuses années de travaux sur la fertilisation azotée du canola seront bientôt incorporés dans la version révisée des recommandations provinciales. Les méthodes mécaniques de lutte contre les mauvaises herbes dans cinq cultures ont été évaluées en comparaison avec l'emploi d'herbicides. (CTANL)

Les progrès de la recherche sur les semences artificielles ont permis d'accroître la vigueur et la performance des embryons somatiques secs de luzerne qui serviront de prototype dans les programmes commerciaux d'amélioration de la luzerne. (UG)

Au cours d'essais en laboratoire, des plants de luzerne transgéniques ou créés par manipulations génétiques ont affiché une tolérance accrue aux températures inférieures à zéro et à l'inondation. C'est la première fois que l'on montre qu'il est possible d'améliorer la résistance à l'hiver grâce au génie génétique. Cette année, des essais en vraie grandeur ont été proposés pour déterminer les effets de ces modifications sur la persistance et la longévité des peuplements de luzerne dans les conditions réelles des hivers ontariens. (UG)

Des essais portant sur les semences d'herbes à gazon et de cultures fourragères ont montré que la production de semences de graminées pourrait être rentable en Ontario. Les essais effectués en Ontario concernaient le ray-grass vivace, la fétuque élevée, le pâturin des prés, l'agrostide, la fétuque ovine durette et la fétuque rouge gazonnante. Toutes ces espèces ont affiché des rendements comparables à ceux obtenus dans les actuelles régions productrices. (UG)

Des méthodes ont été élaborées pour évaluer et sélectionner la qualité post-ensilage de populations améliorées de luzerne; ces

pH-decline using a "mini-ensiling" technique. These procedures should lead to alfalfa germplasm more suitable for high quality haylage production. (UG)

méthodes, fondées sur une baisse du pH obtenue par la technique du « mini-ensilage », devraient déboucher sur la production de germoplasme de luzerne mieux adapté à la production de foin mi-fané de haute qualité. (UG)

In August 1991, the first series of turfgrass performance trials was established at Kemptville College with twenty-five variety selections. Good results in winter survival and the performance of these grasses through the summer will provide valuable information to the turfgrass industry of eastern Ontario. Survival data, which is very limited for the Ottawa valley, will be applicable to many other areas of Ontario. Expansion of the program has continued in 1992. (KCAT)

En août 1991, vingt-cinq variétés sélectionnées de graminées à gazon ont fait l'objet d'une première série d'essais axés sur la performance, au collège d'agriculture de Kemptville. De bons résultats en matière de résistance à l'hiver et de rendement de ces graminées durant l'été livreront des renseignements utiles aux producteurs de gazon en plaques de l'est de l'Ontario. Les données sur la résistance, qui sont très restreintes pour la vallée de l'Outaouais, seront applicables à de nombreuses autres régions de l'Ontario. Le programme s'est poursuivi en 1992 (CTAK).

As a result of several years of work a variety testing system for sweet lupins has been developed. Two cultivars have been supported for registration in Canada. (CCAT)

Au terme de plusieurs années de travail, un système d'essais de variétés a été élaboré pour les lupins doux. L'homologation de deux cultivars a été recommandée au Canada (CTAC).

Co-operative research with scientists at Agriculture Canada has resulted in the observation of significant correlation between plant architecture in dry edible beans (Phaseolus vulgaris) and agronomic yield. This confirms the assumed merits of testing and production of upright architecture cultivars in narrow row widths. (CCAT)

Une recherche menée en collaboration avec des chercheurs d'Agriculture Canada a permis l'observation d'une corrélation significative entre l'architecture végétale des haricots secs comestibles (Phaseolus vulgaris) et le rendement agronomique. Ces résultats confirment l'intérêt supposé des essais et de la production de cultivars à architecture verticale dans les peuplements en lignes rapprochées (CTAC).

The soybean breeding program released its fifth soybean cultivar to seed growers this spring. RCAT Tabby is a high yielding, yellow hilum cultivar with excellent lodging tolerance and with resistance to phytophthora root rot. (RCAT)

Le programme d'amélioration du soja a permis la diffusion d'un cinquième cultivar aux producteurs de semences ce printemps. Il s'agit de Tabby, créé au CTAR, un cultivar à hile jaune, à rendement élevé, doté d'une excellente tolérance à la verse et résistant au mildiou du pied (CTAR).

In 1991, the U. of Guelph completed development of, or released, the following varieties:

En 1991, l'université de Guelph a créé ou lancé sur le marché les variétés suivantes :

OAC Shire soybean; OAC Talbot soybean; OAC Vision soybean; OAC 89-01 (tentatively OAC Eramosa) soybean; OAC 89-11 (tentatively OAC Sparta) soybean; OAC SR 90-02 (tentatively OAC Springfield) spring canola; OAC Laser white bean; and OAC 89-C1 pinto bean. (UG)

Le soja OAC Shire; le soja OAC Talbot; le soja OAC Vision; le soja OAC 89-01 (éventuellement nommé OAC Eramosa); le soja OAC 89-11 (éventuellement nommé OAC Sparta); le canola de printemps OAC SR 90-02 (éventuellement nommé OAC Springfield); le haricot blanc OAC Laser et le haricot pinto OAC 89-C1. (UG)

A second major bacterial blight resistance gene for field beans was identified. Thirty-nine blight resistant lines were advanced toward 1993 registration trials which could solve most blight problems in this crop by the mid-to-late 1990's. (UG)

On a identifié un deuxième gène majeur de la résistance à la brûlure bactérienne chez le haricot de grande culture. Trente-neuf lignées résistantes à la brûlure ont été proposées pour les essais pré-homologation en 1993; on pourrait ainsi résoudre la plupart des problèmes de brûlure bactérienne chez le haricot de grande culture d'ici à la fin des années 1990. (UG)

The superior attributes of strain 532C of soybean rhizobium were identified. Use of this strain to inoculate crops can result in an expected increase of $3 million per year to the Ontario soybean

On a identifié les attributs supérieurs de la souche 532C du rhizobium du soja. L'inoculation du soja avec cette souche pourrait permettre aux producteurs ontariens d'accroître leurs recettes de 3

farmgate receipts. (UG)

Efficient protocols for free-fatty acid determinations and blackleg ratings in winter canola have led to significant changes in variety recommendations, which will reduce losses to producers and the processing sector. Growth regulators (under evaluation) may improve survival of winter canola permitting a broader geographic range of winter canola production in Ontario. (UG)

## Food

Significant research funding flows from OMAF into the preservation of locally grown food products in order to help increase efficiency, self-sufficiency, and to help our industry compete with imported products.

Research found that Ontario consumers were interested in organic food products if they were priced competitively with conventional products. An independent certification program for organic food would be well accepted by the consumer, who would be willing to pay the costs of such a program. A recognized, standardized logo would instill consumer confidence and enhance the organic products market. (UG)

Research shows that the over-50 age group is a very homogeneous market in terms of the value-added products they want from the agri-food system. Other findings include: seniors want good service, prices and products from the stores in which they shop, and are willing to travel to a store(s) they like. Their concern about nutrition is reflected in their desire for nutrition information, as well as their tendency to avoid foods they feel are not healthy (a perception they often have about processed foods). (UG)

Research results showed that consumers, at the point of purchase, preferred a lean meat product over a fat one, but preferred the latter in a taste test. Vacuum-packed, aged, lean steaks offered a consumer-acceptable product that was pleasing both visually and to the taste. (UG)

Moist, sprout damaged grain was subjected to a treatment by which the outer layers were selectively removed, leaving the contour of the grain practically unchanged. Tests on flours milled from this grain indicated a marked improvement in baking quality. Conditions have been developed for the production of flours of acceptable quality, using an optimum combination of this process, gravity separation, and established permissible levels of sprout damaged wheat. (UG)

millions de dollars par an. (UG)

Des protocoles permettant de déterminer efficacement la composition en acides gras libres et la sensibilité à la jambe noire du canola d'automne ont entraîné des changements importants dans les recommandations concernant les variétés, ce qui aidera les producteurs et les transformateurs à limiter leurs pertes. Des régulateurs de croissance (en cours d'évaluation) sont suceptibles d'améliorer la résistance à l'hiver du canola d'automne et donc d'étendre la culture du canola à une plus grande aire géographique en Ontario. (UG)

## Alimentation

Le MAAO accorde une aide financière appréciable aux recherches sur la préservation des denrées produites dans la province dans le but d'accroître l'auto-suffisance alimentaire et d'aider le secteur agro-alimentaire à être plus efficace et à concurrencer les importations.

Les chercheurs ont constaté que les consommateurs ontariens s'intéressaient aux produits alimentaires biologiques à condition que leurs prix soient concurrentiels avec ceux des produits conventionnels. Les consommateurs verraient d'un bon oeil un programme indépendant de certification et seraient disposés à en supporter le coût. Un logo reconnu et uniformisé inspirerait confiance aux consommateurs et servirait le marché des produits biologiques. (UG)

La recherche montre que les consommateurs de plus de 50 ans forment un débouché très homogène du point de vue des produits agro-alimentaires à valeur ajoutée qu'ils recherchent. En outre, selon cette recherche, les consommateurs de cet âge recherchent dans les magasins qu'ils fréquentent un service de qualité et des bons produits à des prix concurrentiels, et ils sont prêts à faire du chemin pour se rendre à un magasin qu'ils apprécient. Leur souci d'une bonne alimentation se traduit par le désir d'avoir de l'information nutritionnelle et la tendance à éviter les produits jugés selon eux moins bons à la santé (perception courante vis-à-vis des aliments transformés). (UG)

Les résultats des recherches montrent que les consommateurs, au point de vente, préfèrent un produit de viande maigre à un produit de viande gras, mais que, dans un test de dégustation, ils préfèrent ce dernier. Des steaks maigres, rassis, emballés sous vide, constituent un produit acceptable pour le consommateur, étant agréable à l'oeil et au palais. (UG)

Du blé humide et germé a été soumis à un traitement qui consiste à retirer sélectivement les couches extérieures en laissant le contour du grain pratiquement intact. Les essais sur les farines obtenues à partir de ce grain indiquent une amélioration marquée de la qualité boulangère. Des conditions ont été élaborées pour la production de farines de qualité acceptable, faisant appel à une combinaison optimale de ce procédé, à un tri par gravité, et à des proportions établies de blé germé. (UG)

The complete technology has been developed for determining the lipid content and fatty acid composition (including omega-3 fatty acid status) of various Ontario fish products. (UG)

Studies were conducted on beans to determine the factors controlling their processability and help in breeding this desired trait in the crops of Ontario. (UG)

The incorporation of milk components in the traditional tofu of South East Asia is very promising and provides a way to supplement a nutritionally deficient food to a much improved product. (UG)

As consumer interest in improved nutrition grows, so does the need for development of a greater selection of bean products. Recent experimentation using a white bean mixture resulted in a unique bakery product, bean snackers, which received very positive acceptance by a consumer panel. (CCAT)

A variety of cheese types were produced to analyze and identify possible processing variations when utilizing goats' milk for cheese production. (KCAT)

Une technique complète a été élaborée pour déterminer la teneur en lipides et la composition en acides gras (y compris les acides gras oméga-3) de divers produits ontariens à base de poisson. (UG)

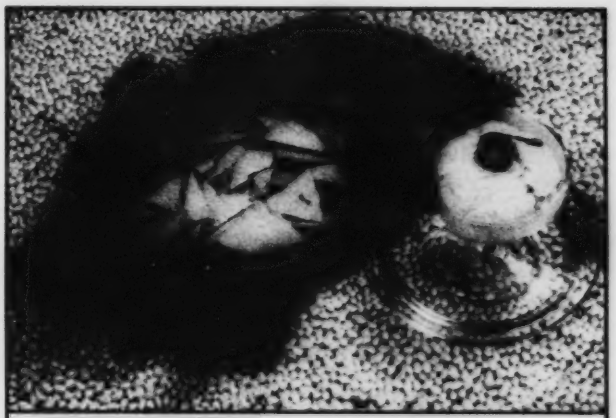
Des études portant sur le haricot ont cherché à déterminer les facteurs influant sur l'aptitude à la transformation en vue d'améliorer cette caractéristique intéressante chez les haricots cultivés en Ontario. (UG)

L'incorporation de constituants du lait dans le tofu traditionnel du Sud-Est asiatique a donné des résultats très encourageants. Elle permet d'améliorer considérablement ce produit à valeur nutritive incomplète. (UG)

Les consommateurs se préoccupent de plus en plus d'améliorer leur alimentation, d'où la nécessité de développer un plus grand choix de produits à base de haricots secs. De récentes expériences portant sur un mélange de haricots blancs ont abouti à la création d'un produit de boulangerie d'un genre nouveau, les craquelins aux haricots, qui ont été très appréciés par un groupe de dégustateurs. (CTAC)

On a fabriqué des fromages de divers types avec du lait de chèvre dans le but d'analyser et d'identifier les variantes possibles offertes dans ce domaine. (CTAK)

Modified-atmosphere packages of four freshly processed, ready-to-use vegetables, i.e. onion, carrot, rutabaga and butternut squash, were examined with respect to changes in gas composition, microbial population, and sensory quality in refrigerated storage. Results indicated that temperatures lower than 6°C were necessary to retard microbial growth, respiration rate and off-flavour development inside the packages. After two weeks of storage, off-odour and taste change were not significant. (HRIO)



**A white pea bean frozen dessert and bean snackers**

**Craquelines et dessert congelé faits de haricots blancs**

Quatre légumes (oignon, carotte, rutabaga, courge Butternut) prêts à l'emploi, fraîchement préparés, emballés sous atmosphère modifiée, ont été examinés relativement aux modifications subies par la composition gazeuse, la flore microbienne et la qualité sensorielle au cours de l'entreposage réfrigéré. Les résultats indiquent qu'il est nécessaire d'entreposer les produits à une température inférieure à 6° C pour réduire le taux de respiration et retarder la prolifération microbienne ainsi que l'apparition d'une mauvaise odeur dans les emballages. Après deux semaines de réfrigération, l'odeur et la saveur des légumes s'étaient peu altérées. (IRHO)

A data bank has been developed on the composition of commercial fruit cultivars grown in Ontario for the verification of fresh and processed fruits. The results clearly indicate that it is possible to verify and distinguish between different fruits on the basis of their sugar and acid composition profiles. Anthocyanin pigment profiles allow separation of red cultivars. This technology has been used by the food industry to verify quality and true-to-type

Grâce à la création d'une banque de données sur la composition des cultivars de fruits commerciaux cultivés en Ontario, il est possible de vérifier les fruits frais et les fruits transformés. Les résultats indiquent clairement qu'il est possible de faire la distinction entre différents fruits d'après leur teneur en acides et en sucres. Les profils des anthocyanines permettent de distinguer les cultivars rouges. Cette technique est utilisée par l'industrie

of purchased ingredients. Regulatory agencies have also used this technology on verification of fruits and fruit products. (HRIO)

## Horticultural Crops

Horticultural research sponsored by OMAF supports a diverse industry including fruit, vegetables, ornamental and floral crops, and turfgrass.

'Victory', a new European plum was named from Vineland in 1991. It is an attractive, productive, good quality, large, semi-clinging, greenish-yellow fleshed, medium-firm plum. 'Victory' matures towards the end of September, similar to 'Bluebell', or four to five days later than the standard cultivar 'Stanley'. (HRIO)

Research on high-density pear plantings on quince size-controlling rootstock carried out at Vineland since 1975 has been adopted by many fruit growers. Pear trees on this rootstock fruit earlier and yield three times more compared to standard seedling rootstock. (HRIO)

'Veeglo/Bailey' peach trees supported on a trellis and pruned to a central-leader training system produced more fruit than the other four trellis training systems and the standard modified leader, free-standing trees. Central-leader training of peach trees provides a system in which a large proportion of good fruiting wood can be maintained near the ground within easy reach of workers. Other potential benefits of central-leader pruning include uniform light distribution throughout the tree canopy, improved fruit size and quality, stronger trees, greater orchard longevity, more efficient pest management, and potential adaptation for mechanization of pruning, fruit thinning and harvesting. (HRIO)

Twenty-one of twenty-five cultivars of strawberry, cooled to 0°C and then exposed to 15% carbon dioxide for 42 hours were found to be significantly firmer than untreated, field-fresh and untreated stored fruit. The average increase in firmness was 29.5%. (HRIO)

The apple storage research program at the Horticultural Products Laboratory has provided useful information to help storage operators decide how long they can hold apples at certain temperatures before cold, regular controlled atmosphere (CA), or low-oxygen CA storage conditions can be established. (HRIO)

Three new strawberry varieties, 'St. Williams', 'Scotland' and 'Selkirk' were released. 'St. Williams' is outstanding for freezing, 'Scotland' is recommended for machine harvesting and decapping and 'Selkirk' has excellent fruit quality for both the fresh market

alimentaire pour vérifier l'authenticité et la qualité des ingrédients achetés. Les organismes chargés de la réglementation font également appel à ces techniques pour vérifier les fruits et les produits à base de fruits. (IRHO)

## Productions horticoles

Le MAAO finance des recherches horticoles pour appuyer un secteur d'activité très diversifié qui produit des fruits, des légumes, des plantes ornementales, des fleurs, et du gazon.

Une nouvelle prune européenne a été baptisée à Vineland du nom de « Victory » en 1991. Il s'agit d'une grosse prune jaune-verte, productive, de bel aspect, de bonne qualité, à noyau partiellement adhérent, à chair moyennement ferme. « Victory » mûrit vers la fin de septembre, comme « Bluebell », soit 4 ou 5 jours plus tard que le cultivar standard « Stanley ». (IRHO)

À la suite des recherches effectuées à Vineland depuis 1975 sur les plantations à forte densité de poiriers greffés sur des porte-greffe nanisants de cognassier, de nombreux pomiculteurs ont adopté ce type de poirier qui fructifie plus tôt et produit trois plus que les poiriers standards issus de semis. (IRHO)

Des pêchers « Veeglo/Bailey » palissés et formés selon la méthode de l'axe central ont produit plus de fruits que les pêchers conduits selon quatre formes de palissage et ceux qui étaient conduits selon la méthode du gobelet différé. La méthode de l'axe central donne un arbre dont une grande proportion du bois à fruit peut être maintenu près du sol, à portée facile des cueilleurs. Autres avantages possibles de ce mode de formation : éclairement uniforme de l'ensemble de la couronne, fruit de plus grosse taille et de meilleure qualité, arbre plus fort, plus grande longévité de la plantation, lutte antiparasitaire plus efficace, adaptation possible à la mécanisation des opérations de taille, d'éclaircissage des fruits et de cueillette. (IRHO)

Vingt-et-un cultivars de fraises, sur un total de 25, qui avaient été refroidis à 0° C, puis placés dans une atmosphère composée à 15 % de $CO_2$, étaient plus fermes que des fraises venant d'être cueillies mais non ainsi conditionnées et des fraises entreposées sans conditionnement. La fermeté avait augmenté en moyenne de 29,5 %. (IRHO).

Grâce au programme de recherche sur l'entreposage des pommes, le laboratoire des productions horticoles a donné aux responsables d'entrepôts des renseignements utiles pour les aider à connaître le temps qu'ils peuvent garder les pommes à certaines températures avant leur transfert dans un local à atmosphère froide contrôlée ordinaire ou à atmosphère contrôlée pauvre en oxygène. (IRHO)

Trois nouvelles variétés de fraises, « St. Williams », « Scotland » et « Selkirk » ont été mises sur le marché. « St. Williams » est de qualité remarquable pour la congélation, « Scotland » est recommandée pour la mécanisation de la cueillette et de

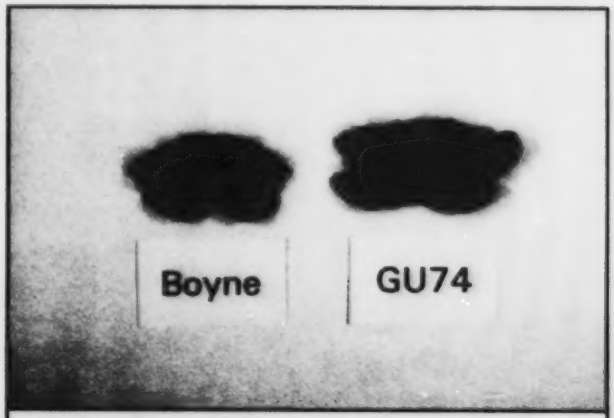
and processing. (HRIO)

'Algonquin', a high-yielding red raspberry variety, was released for Ontario growers as a result of trials at the Horticultural Experiment Station, Simcoe. This variety was bred at the Agriculture Canada Research Station, Vancouver. (HRIO)

Supported apple trees yielded significantly higher than non-supported trees in six years of experiments. Support reduces the need to produce structural wood at the expense of fruit. Support can also reduce pruning costs and permit larger yields. (HRIO)

Yield trials of several advanced summer bearing red raspberries were evaluated in Ontario and Quebec. Two selections, GU74 (OAC Regal) and GU75 (OAC Regency) have proven superior and will be released as named cultivars. Both selections have a higher level of winterhardiness than 'Boyne' and were superior in yield and berry size compared to 'Boyne', 'Comet' and 'Killarney'. (UG)

Simulated frost damage to ovules, induced by insertion of a needle into the ovary, brought about dramatic effects of fruit growth and development (e.g. reduced fruit weight, induced fruit drop, increased incidence of fruit deformity) and may be an acceptable way to study the role of seeds in fruit growth regulation. (UG)




OAC Regal raspberries — Framboises OAC Regal

A novel propagation technique has been established (patent applied for) for the production of multiple pea plants. This technique represents a major step forward in developing strategies to create genetically improved vegetables with resistance to common diseases. (UG)

An efficient and precise protocol was developed for determination of dose-response relationships between environmental contaminants and vegetable yield. Efficient experimental designs and statistical modelling approaches were combined into a powerful package to study interaction among multiple environmental factors. (UG)

Recirculating leachate from tomatoes in rockwool did not affect the performance of the crop. This technique will drastically reduce

l'équeutage; « Selkirk » donne des fruits d'excellente qualité tant pour le marché frais que pour la transformation. (IRHO)

« Algonquin », une variété de framboisier à fruits rouges à haut rendement, a été mis sur le marché ontarien à la suite d'essais conduits à la Station expérimentale d'horticulture à Simcoe. Cette variété a été créée à la station de recherche d'Agriculture Canada à Vancouver. (IRHO)

Des pommiers tuteurés ont donné nettement plus de fruits que les pommiers non tuteurés au cours de six années d'essais. Un arbre tuteuré n'a pas besoin de fabriquer autant de bois de soutien, et peut donc produire plus de fruits. Le tuteur permet aussi de réduire le coût de la taille et d'accroître le rendement. (IRHO)

Des essais axés sur le rendement de plusieurs framboisiers à fruits rouges non remontants ont été évalués en Ontario et au Québec. Deux sélections, GU74 (OAC Regal) et GU75 (OAC Regency), qui se sont révélées supérieures, seront mises sur le marché en tant que cultivars nommés. Elles sont plus résistantes à l'hiver que «Boyne» et supérieures en rendement et en taille des fruits que « Boyne », « Comet » et « Killarney ». (UG)

La simulation d'une lésion du gel infligée à des ovules par introduction d'une aiguille dans l'ovaire a entraîné des effets spectaculaires sur la croissance et le développement des fruits (par ex. poids réduit, chute induite, incidence plus élevée des déformations). Cette simulation pourrait être un moyen acceptable d'étudier le rôle des graines dans le déroulement de la croissance du fruit. (UG)

Une nouvelle technique de multiplication a été créée (le brevet a été demandé) en vue de produire des plants multiples de pois. Cette technique marque une étape importante vers l'élaboration de stratégies destinées à créer des légumes améliorés, résistants aux maladies communes. (UG)

Un protocole efficace et précis a été élaboré pour déterminer les relations dose-réponse entre les contaminants de l'environnement et le rendement des légumes. Des méthodes efficaces d'expériences et de modélisation statistique se conjuguent pour former un outil puissant d'étude de l'interaction entre les multiples facteurs environnementaux. (UG)

Le recyclage des éléments fertilisés recueillis dans la laine de roche n'a pas nui à la performance des tomates qui y étaient

potential ground water contamination and lower fertilizer and water inputs. (HRIO)

Shading greenhouse tomatoes during periods of high light intensity improved fruit quality but reduced total yield. (HRIO)

A cultivar trial of eggplant was grown in 1991 at the Horticultural Experiment Station in Simcoe. This contained 25 entries with a vast range of fruit size, shape and colours. In descending order of yield, the top cultivars were: 'Ghostbuster' (ivory coloured), 'Jersey King', 'Murena', 'Classic', 'Black Magic' (oval shaped), 'Mirabel' (long, slender), and 'Black Bell'. (HRIO)

In a trial of 25 muskmelon cultivars, 'Rising Star' had the highest early yield (36.8 tonnes per hectare) and total yield (65.6 tonnes per hectare). It also ranked high in sugar content and overall quality making it a suitable cultivar for Ontario production. (HRIO)

In a trial of 43 pepper cultivars, 'Belle King' had the highest early yield (15.6 tonnes per hectare) and total yield (34.1 tonnes per hectare). This medium-to-large elongated bell pepper which turns from green to red at maturity offers an improvement over existing cultivars for early bell pepper production in Ontario. (HRIO)

The production of potato plantlets in the SPUD Lab increased dramatically, from approximately 4,000 in 1990 to over 20,000 in 1991, by using a technique developed by researchers at the U. of Guelph. The majority of these plantlets were used to produce greenhouse minitubers. (NLCAT/UG)

Use of an early potato cultivar, chitting and high density planting resulted in an eight to ten tonnes per hectare yield advantage over nonchitted seed. This combination of treatments resulted in a three-week earlier harvest than controls for a similar yield. (HRIO)

cultivées. Cette technique permettra de réduire considérablement le risque de contamination de l'eau souterraine et les quantités d'engrais et d'eau utilisées. (IRHO)

L'ombragement des tomates cultivées en serre pendant les périodes de forte luminosité a permis d'obtenir des fruits de meilleure qualité, mais a réduit le rendement total. (IRHO)

Des cultivars d'aubergine ont fait l'objet d'essais en 1991 à la Station d'horticulture expérimentale de Simcoe. Il s'agissait de 25 cultivars très différents par la taille, la forme et la couleur des fruits. Par ordre décroissant de rendement, les cultivars qui se sont le mieux classés sont : «Ghostbuster» (couleur ivoire), «Jersey King», «Murena», «Classic», «Black Magic» (ovoïde), «Mirabel», (long et mince), et «Black Bell». (IRHO)

Au cours d'un essai portant sur 25 cultivars de melon brodé, c'est «Rising Star» qui a donné le plus haut rendement en primeur (36,8 tonnes à l'ha) et le plus haut rendement total (65,6 tonnes à l'ha). Il s'est aussi très bien classé pour la teneur en sucre et la qualité globale, ce qui en fait un cultivar très bien adapté à la production en Ontario. (IRHO)

À l'issue d'un essai portant sur 43 cultivars de poivrons, c'est «Belle King» qui a donné le meilleur rendement en primeur (15,6 tonnes à l'ha) et le plus haut rendement total (34,1 tonnes à l'hectare). Ce poivron cloche, de forme allongée, de taille moyenne ou grosse, qui vire du vert au rouge à maturité, constitue une amélioration par rapport aux cultivars existants pour les producteurs de poivrons cloches hâtifs en Ontario. (IRHO)

La production de plants de pommes de terre au Laboratoire SPUD a grimpé en flèche, passant d'environ 4 000 en 1990 à plus de 20 000 en 1991, grâce à une technique mise au point par les chercheurs de l'Université de Guelph. La majorité des plants ont été utilisés pour produire des microtubercules de serre. (CTANL/UG)

Le choix d'un cultivar de pomme de terre hâtif, la suppression des germes et la plantation à forte densité on donné une récolte supérieure de 8 à 10 tonnes à l'ha à celle des semences dont les germes n'avaient pas été supprimés. Cette combinaison de traitements a permis de récolter trois semaines plus tôt que dans les parcelles témoins à rendement égal. (IRHO)

**Hilling potatoes in the greenhouse to produce minitubers.**

**Buttage en serre des plants de pommes de terre pour la production de microtubercules.**

In response to a request from the processing tomato industry, seed from two new RCAT cultivars (9101 and 9102) was made available for testing. These two lines show some promise for silty soil types where other cultivars often produce too much vine growth. (RCAT)

Fertilizer management programs were developed for the production of high quality plug tomato transplants. (RCAT)

Subirrigation of potted plants, which allows recirculation of the nutrient solution, has shown similar growth as a low volume drip irrigation system. Both systems have shown an accumulation of soluble salts in the top layer of the growing medium. (HRIO)

En réponse à la demande des transformateurs de tomates, les semences de deux nouveaux cultivars du CTAR (9101 et 9102) ont été mises à l'essai. Ces deux lignées paraissent prometteuses pour la culture dans les sols de type limoneux où les autres cultivars produisent souvent trop de verdure. (CTAR)

Des programmes de fertilisation raisonnée ont été conçus pour la production de plants de tomates en mottes de haute qualité (CTAR)

La sous-irrigation de plantes en pots, qui repose sur le recyclage de la solution nutritive, a donné les mêmes résultats du point de vue de la croissance que le système d'irrigation goutte à goutte à faible volume. Les deux systèmes ont entraîné l'accumulation de sels solubles dans la couche superficielle du milieu de croissance. (IRHO)

Supplemental lighting (24hr/day high pressure sodium lights) on freesias shortened the time to flower by one to two weeks but reduced both stem quality (weight and length) and the number of flower buds. (HRIO)

Field studies on the effect of wire basket transplant containers on growth and development of landscape trees determined that wire baskets, left intact after planting, do not injure tree roots or jeopardize transplanting success. Greenhouse and laboratory studies with single root two-year-old trees found that wire girdles had no adverse effect on growth of three landscape species. (UG)

A combination of pot-in-pot container growing in the field may enable nurseries to optimize water and fertilizer inputs and increase productivity. (UG)

Studies indicate that humidity control can improve the overall water status of rose plants. This has a beneficial influence on yield, fresh weight, and postharvest shelf life. (UG)

**Wire baskets do not injure tree roots or reduce transplanting success.**

**Les paniers grillagés n'endommagent pas les racines d'arbres et ne compromettent pas les réussite de la transplantation.**

Des freesias soumis à un éclairement prolongé (24 h/jour de lumière avec des lampes au sodium sous haute pression) ont fleuri entre une et deux semaines plus tôt, mais portaient moins de boutons et avaient des tiges de moins bonne qualité (poids et longueur). (IRHO)

Des études en vraie grandeur ont montré que le fait de laisser les paniers grillagés autour des racines des arbres d'agrément après leur transplantation ne lèse pas les racines et ne compromet pas les chances de reprise de l'arbre. Les études en serre et en laboratoire sur des arbres de deux ans à racine unique ont montré que les paniers grillagés ne gênent en rien la croissance, chez trois espèces d'arbres d'agrément. (UG)

La combinaison de culture en double conteneur et de culture en terre devrait permettre aux pépiniéristes d'optimiser les apports d'eau et d'engrais et d'accroître la productivité. (UG)

Des études indiquent que la régulation de l'humidité peut améliorer l'état hydrique général des rosiers. Elle a en effet une influence bénéfique sur le rendement, le poids frais et la durée de vie après la cueillette. (UG)

'Lilo' poinsettia plants were grown on an ebb and flow bench system of subirrigation. Analysis of all parameters indicated that applying fertilizer for the first nine weeks of the crop cycle followed by clear water only for the duration of the crop, results in the most efficient use of applied fertilizer nitrogen. Although less fertilizer is applied, plants of equal quality to continually fertilized plants are produced. (UG)

Des poinsettias «Lilo» ont été cultivés avec un système de sous-irrigation discontinue. L'analyse de tous les paramètres indique que l'application d'engrais pendant les neuf premières semaines du cycle de la culture, suivie d'apport d'eau claire pendant le reste du cycle, résulte en un emploi efficace de la fertilisation azotée. Bien qu'elles reçoivent moins d'engrais, les plantes sont de qualité égale à celles qui sont fertilisées continuellement. (UG)

Sewage sludge is a valuable source of organic matter; as well it contains macro-nutrients and micro-nutrients required for plant growth. Composted sewage sludge can be used as an organic nitrogen source or a soil amendment for turgfrass. (UG)

Les boues d'épuration sont une source précieuse de matière organique; elles contiennent en outre les macro-éléments et les oligo-éléments dont les végétaux ont besoin pour se développer. Les boues d'épuration compostées peuvent être utilisées comme source d'azote organique ou d'amendement du sol pour la production du gazon. (UG)

Species selection and nitrogen fertility regimes can give significant improvement of non-chemical weed control in turfgrass. Perennial ryegrass and tall fescue proved to be relatively resistant to broadleaf weed invasion, followed by fine fescues with Kentucky bluegrass being the most susceptible. (UG)

Le choix des espèces et du régime de fertilisation azotée permet d'améliorer la lutte non chimique contre les mauvaises herbes dans le gazon. Le ray-grass vivace et la fétuque élevée se sont avérées relativement résistantes à l'invasion des dicotylédones, devançant les fétuques fines; le pâturin des prés s'est montré le moins résistant. (UG)

Increasing the nitrogen rate and splitting the applications over two dates reduced weed infestation in all species. Selecting the appropriate species and nitrogen fertility regime will give the turfgrass manager a method of controlling broadleafed weeds without herbicides. (UG)

En augmentant la dose d'azote et en l'épandant en deux fois, on a réduit l'infestation par les mauvaises herbes chez toutes les espèces. Le choix des espèces appropriées et du bon régime de fertilisation azotée permet au producteur de gazon en plaques de lutter contre les dicotylédones sans recourir aux herbicides. (UG)

## Pest Management

## Lutte antiparasitaire

The focus of the pest management research is on the reduction of synthetic chemical pesticides in the environment through the development of programs that combine reduced pesticide application with genetic resistance, biological control, cultural practices, etc.

L'objet de la recherche sur la lutte antiparasitaire est de réduire le rejet de pesticides chimiques synthétiques dans le milieu naturel grâce à des programmes qui combinent l'application réduite de pesticides avec la résistance génétique, la lutte biologique, les pratiques culturales, etc.

In soybean competition studies, uncontrolled weeds reduced soybean seed yield by 67%. Narrow row widths and later maturing varieties increase crop tolerance of weeds. (UG)

Des études sur la concurrence entre les végétaux ont montré que le rendement d'une culture de soja diminue de 67 % lorsqu'aucune mesures n'est prise contre les mauvaises herbes. La tolérance envers les mauvaises herbes augmente avec l'étroitesse des interlignes et l'emploi de variétés tardives. (UG)

Competition studies with ragweed in field beans indicated that one weed per square metre reduced yield by 20% while eight weeds per square metre reduced yield by 36% compared to weed free production. (UG)

Des études sur la concurrence entre les végétaux portant sur l'herbe à poux dans le haricot de grande culture ont montré que la présence d'un pied d'herbe à poux au mètre carré réduit le rendement de 20 %, et la présence de huit pieds au mètre carré le réduit de 36 %, comparativement à une culture propre. (UG)

In corn, early emergence of pigweed (two per square metre) reduced yields by 15% while late emergence of pigweed had only minor effects. (UG)

Dans le maïs, l'amarante réduit le rendement de 15 % lorsqu'elle lève de bonne heure (deux pieds au mètre carré), mais elle est pratiquement sans effets lorsqu'elle lève tard. (UG)

Evaluation of several weed management systems in no-till corn and soybean indicated that banded pre-emerge herbicide application plus shallow inter-row cultivation resulted in yield similar to more intensive broadcast herbicide applications. Annual weed

L'évaluation de plusieurs systèmes de lutte contre les mauvaises herbes dans le maïs et se soja semés sur un sol non travaillé a permis de constater que l'application d'herbicide sur le rang, en prélevée, associé à un travail léger du sol dans les interlignes, aboutit au même

populations were highest when post-plant weed management consisted of inter-row cultivation alone. (UG)

Imazethapyr (PURSUIT) provides excellent season long weed control when applied postemergence on white and kidney beans. Under certain conditions maturity may be delayed seven to ten days and yield reductions can occur with high rates and late applications. (CCAT)

Two herbicides, 'Titus' and 'Ultim' showed excellent activity in controlling grasses and broadleaf weeds in potatoes and sweet corn. These herbicides belong to a new class of compounds, sulfonyl ureas and have a very low use rate (7.5 to 25 grams per hectare). At the same time that the activity of these new products has increased, the same stringent standards have had to be met. The reduction in the amount of pesticides, therefore, has real environmental advantages. These products are expected to become extremely important crop protection chemicals in the future. (HRIO)

SAN 582 HC, a new acetanilide, provided commendable annual grass, nutsedge and annual broadleaf control when combined with atrazine, cyanazine, and dicamba for corn. (RCAT)

Amino triazole proved to be the most effective of 17 treatments tested for control of problem weeds horsenettle and smooth and hairy ground cherry. Hairy galinsoga was controlled by a wide variety of triazine, acetanilide, diphenyl ether and sulfonyl herbicides tested. (RCAT)

Research was continued on management of potato insects with major emphasis on the Colorado potato beetle. The potential of a predatory stink bug for Colorado potato beetle control was assessed. Release of laboratory-reared stink bug nymphs significantly reduced Colorado potato beetle numbers in cage tests done under field conditions. (UG)

The Western Flower thrip is a major pest of greenhouse crops. The Minute Pirate Bug, *Orius insidiosus*, has been promoted as an effective biological control agent for this pest and is currently marketed to growers. At present, an inexpensive and effective method of mass rearing *O. insidiosus* is being developed. The feasibility of storing large numbers of *Orius* until required for marketing has been demonstrated. (UG)

With the loss of currently registered materials, a control strategy was devised for tail head mange of dairy cattle. It is now possible to treat it very successfully with NIX head-louse shampoo for children. (UG)

In studies on human exposure to pesticides total dose received

rendement que les applications plus intensives d'herbicide en pleine surface. La densité des mauvaises herbes annuelles a été la plus élevée dans les parcelles où l'on pratiquait seulement le travail superficiel dans les interlignes. (UG)

L'imazéthapyr (PURSUIT) tient en échec les mauvaises herbes pendant toute la saison quand il est appliqué en postlevée sur les haricots blancs et les haricots rognons. Dans certaines conditions, il peut arriver que la maturité soit retardée de sept à dix jours, et que le rendement baisse lorsque l'imazéthapyr est épandu tardivement à forte dose. (CTAC)

Deux herbicides, «Titus» et «Ultim» ont donné d'excellents résultats contre les graminées et les dicotylédones dans les pommes de terre et le maïs doux. Ces herbicides, qui appartiennent à une nouvelle classe de composés, les sulfonylurées s'épandent à très faible dose (7,5 à 25 grammes à l'hectare). Alors que l'activité de ces nouveaux produits a augmenté, les mêmes normes sévères continuent à être imposées. La réduction de la quantité de pesticides présente donc des avantages certains pour l'environnement. Ces produits devraient jouer à l'avenir un rôle extrêmement important dans la défense chimique des végétaux. (IRHO)

SAN 582 HC, un nouvel acétanilide, a permis une remarquable lutte contre les graminées annuelles, le souchet comestible et les dicotylédones annuelles dans le maïs, quand il est mélangé à l'atrazine, à la cyanazine et au dicamba. (CTAR)

Sur 17 produits essayés contre les mauvaises herbes problématiques, morelle de la Caroline, coqueret glabre et coqueret velu, c'est l'aminotriazole qui s'est avéré le plus efficace. Le galinso gacilié est tenu en échec par une grande variété d'herbicides, triazines, acétanilides, éthers diphényls et sulfonyles. (CTAR)

La recherche s'est poursuivie sur les ennemis de la pomme de terre, plus spécialement sur le doryphore. Les chercheurs ont évalué le potentiel d'une punaise prédatrice du doryphore. Des lâchers de nymphes de punaises élevées en laboratoire ont nettement réduit le nombre des doryphores au cours de tests en cages effectués en conditions réelles. (UG)

Le thrips des petits fruits est un ennemi redoutable des végétaux de serre. La punaise *Orius insidiosus*, présentée comme un auxiliaire biologique intéressant contre le thrips, est actuellement mise en vente auprès des serristes. Les chercheurs travaillent présentement à mettre au point un moyen efficace et bon marché d'élever *O. insidiosus* en grandes quantités. Ils ont démontré qu'il est possible de stocker de grands nombres d'*O. insidiosus* jusqu'au moment de les écouler sur le marché. (UG)

Par suite de la perte des produits déjà homologués, il a fallu concevoir une stratégie de lutte contre la gale chorioptique chez les bovins. On peut maintenant traiter très efficacement cette affection avec du shampoing NIX contre les poux chez les enfants. (UG)

Dans des études sur l'exposition des humains aux pesticides, on

by home gardeners applying 2,4-D and bystanders living within the household, but not applying the pesticide, was measured. Highest exposures were consistently associated with spills of the liquid concentrate or excessive contact with the dilute mixture on the hands or forearms. No detectable residues of 2,4-D were found in the urine of bystanders to home or professional spraying. No residues of 2,4-D were found in 96 hour urine samples supplied by volunteers except for three people who were barefoot and wearing shorts and contacted the sprayed turf one hour following 2,4-D application. These results indicate that, at the doses measured, exposure to sprayed turf should present little risk in humans. However, people can reduce exposure to non-detectable levels by remaining off treated turf for a period of 24 hours or until after rainfall or irrigation so that dislodgeable residues and, therefore, potential exposure are essentially zero. (UG)

a mesuré la dose totale reçue par des jardiniers amateurs appliquant du 2,4-D et des personnes qui se trouvent à proximité, mais qui n'appliquent pas le produit. L'exposition la plus forte a été constamment associée à des renversements de concentré liquide ou à des contacts excessifs avec le mélange dilué sur les mains ou les avant-bras. Aucun résidu détectable de 2,4-D n'a été trouvé dans l'urine des personnes se trouvant à proximité de la zone traitée, que le travail soit fait par un amateur ou un professionnel. Aucun résidu de 2,4-D n'a été trouvé dans des échantillons d'urine fournis au bout de 96 heures par des volontaires, excepté chez trois personnes qui étaient nu-pieds, qui portaient un short et qui sont entrées en contact avec la pelouse dans l'heure qui suivait le traitement au 2,4-D. Ces résultats indiquent que, aux doses mesurées, le contact avec une pelouse traitée devrait présenter peu de risques pour les humains. Toutefois, on peut réduire l'exposition aux taux non détectables en s'abstenant d'entrer en contact avec un gazon traité dans les 24 heures qui suivent ou jusqu'à une pluie ou une irrigation de manière que les résidus délogeables et, par conséquent, le risque de contact, soient pratiquement nuls. (UG)

Fluorescent tracers and a video imaging technique for assessing exposure (VITAE) to pesticides in greenhouse operations has been developed. Pesticide exposure has been evaluated at four commercial greenhouse chrysanthemum operations using VITAE. Pesticide applicators had greatest exposure of the skin to pesticide on their hands (58%) and arms (20%). Greenhouse workers (bystanders) when in contact with treated plant material received 42% of total exposure on their hands. Estimated exposure during pesticide application using the VITAE technique was highly correlated with total absorbed dose when compared to the total metabolites found in the urine. (AFLS)

Les chercheurs ont mis au point des traceurs fluorescents et une technique VITAE par images vidéos pour évaluer l'exposition aux pesticides des employés des serres. Des mesures ont été effectuées grâce à la technique VITAE dans quatre serres commerciales de production de chrysanthèmes. Ce sont les employés chargés d'appliquer les pesticides qui ont subi la plus grande exposition aux pesticides par voie cutanée sur les mains (58 %) et les bras (20 %). Les autres employés de la serre qui sont entrés en contact avec les plantes traitées ont subi 42 % de l'exposition totale sur les mains. L'exposition estimée durant l'application de pesticides à l'aide de la technique VITAE a été fortement corrélée avec la dose totale absorbée, après comparaison avec les métabolites totaux trouvés dans l'urine. (AFLS)

In studies on the biocontrol of grey mold fruit rot of strawberries, effective biocontrol was achieved using microfungi and bacteria isolated from strawberry plants. Biocontrol is a feasible alternative to chemical fungicides for fruit rot management. (UG)

**Grey mold on strawberries**

**Moisissure grise sur des fraises**

Dans des études sur la lutte biologique contre la moisissure grise de la fraise, de bons résultats ont été obtenus à l'aide de champignons microscopiques et de bactéries isolées sur les plants de fraisiers. La méthode biologique peut être substituée aux fongicides chimiques pour lutter contre la pourriture des fruits. (UG)

Under moderate moisture conditions, levels of more than 100 spider mites per soybean leaf did not result in any economic loss. (RCAT)

Dans des conditions d'humidité modérée, une infestation de plus de 100 tétranyques par feuille de soja n'a pas causé de perte économique (CTAR).

A guide to the control of insects and plant diseases in tomato plug transplants has been produced to help transplant growers provide healthy plant stocks for the processing tomato industry. (RCAT)

La production d'un guide sur la lutte contre les insectes et les maladies des végétaux dans les tomates en mottes à repiquer permettra aux producteurs de vournir des plants sains pour le secteur de la tomate de transformation. (CTAR)

Research continued on improving the resistance of canola in Ontario to blackleg disease. Increased resistance to blackleg, ranging from 12% to 37%, was found in four of the 332 lines tested. This is the first report of successful selection of disease resistant plants from haploid primary embryos produced from microspores. (UG)

Les recherches se sont poursuivies sur l'amélioration de la résistance du canola à la jambe noire en Ontario. L'augmentation de la résistance à cette maladie, qui va de 12 % à 37 %, a été constatée chez quatre des 332 lignées testées. C'est la première fois que l'on signale le succès d'une sélection de plants résistants à la maladie à partir d'embryons primaires haploïdes issus de microspores. (UG)

Research on the biological control of diseases included the identification and evaluation of promising biological control agents for several diseases such as white mold of bean, white mold of canola, lettuce drop, and dollar spot of turf. Most of these biological control agents are derived from fungi that are naturally present in Ontario but are also highly effective at suppressing the pathogen or the disease, or both. Of particular interest was the discovery that honeybees can be used to disperse these agents into some crops such as canola or rapeseed. (UG)

A recherche sur la lutte biologique contre les maladies porte notamment sur l'identification et l'évaluation d'agents biologiques de lutte contre plusieurs maladies comme la moisissure blanche du canola, le dépérissement de la laitue, la brûlure en plaques du gazon. La plupart de ces agents de lutte biologique sont obtenus à partir de champignons microscopiques qui existent à l'état naturel en Ontario, et qui sont extrêmement efficaces pour éliminer l'agent pathogène ou la maladie ou les deux. Notons que les abeilles peuvent servir à disperser ses agents dans certaines cultures comme le canola ou le colza. (UG)

The Botrytis blight pathogen of ginseng overwinters in the dead stems from the previous year's growth. Removal of crop debris from gardens lowers the severity of the disease. (HRIO)

L'agent pathogène de la brûlure des feuilles de ginseng passe l'hiver sur les tiges mortes de la saison précédente. L'enlèvement des débris de culture des jardins peut diminuer la gravité de la maladie. (IRHO)

A modified cold germination assay identified sweet corn seed lots susceptible to Three Leaf Die-Back, an important disease in early planted fields. (HRIO)

Un essai de germination à froid modifiée a permis d'identifier des lots de semence de maïs doux sensibles au dépérissement au stade trois feuilles, une maladie importante dans le maïs semé hâtivement. (IRHO)

## Soil, Water and Air

## Sol, eau et air

The emphasis of OMAF's soil and water research efforts is on the prevention and reduction of deterioration of these precious resources while maintaining productivity.

Les recherches du MAAO sur l'eau et le sol visent plus particulièrement à prévenir et à réduire la détérioration de ces précieuses ressources tout en maintenant la productivité.

Particular attention is being paid to trace gases because of their economic damage to agricultural crops, damage to buildings, cause of health problems, destruction in the ozone layer, cause of smog, and their contribution to the greenhouse effect and climatic change. A lead salt laser trace gas analyzer has been designed and constructed. It makes accurate trace gas measurements under field conditions possible for the first time. The technology is now being used to measure fluxes of trace gases between the atmosphere and agricultural sources and sinks. Trace gas measurements are of high priority for many agencies and this exciting new technology represents a major breakthrough in enhancing the capability of field measurements with an accuracy much greater than was previously possible. (UG)

On s'intéresse en particulier aux gaz à l'état de trace à cause des préjudices économiques qu'ils causent aux cultures agricoles, des détériorations aux bâtiments, des problèmes de santé, de la destruction de la couche d'ozone, de la formation du smog et de leur rôle dans l'effet de serre et la modification du climat. Les chercheurs ont conçu et fabriqué un appareil au laser à sels de plomb qui permet, pour la première fois, de mesurer avec exactitude les gaz à l'état de trace dans la nature. Ce procédé sert maintenant à mesurer les déplacements de ces gaz entre l'atmosphère et les sources et les dépôts agricoles. De nombreux organismes accordent une grande priorité à la mesure des gaz à l'état de trace et cette nouvelle technique pleine d'avenir améliorera considérablement la possibilité de faire des mesures sur le terrain beaucoup plus exactes qu'auparavant. (UG)

Nine years of research was completed to check the calibration of

Des recherches ont été menées pendant neuf ans pour vérifier la

phosphorus and potassium soil tests for corn under high yield conditions. It was found that the OMAF soil test recommended sufficient phosphate and potash in most situations for maximum economic yields of corn. In many situations more than enough phosphate and potash was recommended. (RCAT)

The soil-nitrogen test for corn was released for use in spring 1991. About 1,000 soil samples were sent to laboratories by farmers in the first year. Studies have been extended to include collection of the data which will be necessary to support a nitrogen-soil test for potatoes and barley. (UG)

New techniques for predicting fertilizer requirements of field grown crops in Ontario have been developed. The research has confirmed that the extractants now used in the soil testing program are as good as any available, and in the case of phosphorus, much better for Ontario soils than the extractants used in jurisdictions to the south or east of this province. In 1991 the work over a number of years was integrated to reach the conclusion that we could reduce the number of soil test extractants from four to two without sacrificing accuracy. (UG)

Cooperative studies have been conducted with three of the Colleges of Agricultural Technology to determine the influence of soil characteristics on the sensitivity of stability to water content. Soil texture and organic matter content appear to play the most important role with soil pH playing a secondary role. The sensitivity to water content increases with clay content and the overall stability increases with both clay and organic matter content. These observations have a significant impact on projections of the response of soil structural stability when remedial measures such as the introduction of forages are considered within cropping systems. (UG)

## Economics

OMAF sponsored research in economics is concerned with the international picture as well as with Ontario farm management and financial practices.

A study analyzing the level of income risk under alternative tillage systems and weed control regimes indicates that mouldboard and chisel-ploughing systems generate less variable incomes on clay soils than no-till and ridge-till systems, but the reverse is true on sandy soil. Total farm costs per hectare were higher for the mouldboard-plough and chisel-plough tillage than for no-till and ridge-till systems, due to higher machinery costs. Variable costs per hectare, however, were higher for the no-till and ridge-till systems because of the need to use pre-emergent herbicide treatments.

justesse des recommandations qui sont faites concernant le phosphore et le potassium d'après les analyses de sol effectuées par le MAAO, en vue d'une production intensive du maïs. On a constaté que les recommandations faites à la suite de ces analyses étaient suffisantes concernant le phosphate et la potasse dans la plupart des situations et dans l'optique d'un rendement économique maximal du maïs. Dans de nombreuses situations, les doses recommandées étaient plus que suffisantes. (CTAR)

L'analyse de sol servant à établir les recommandations d'azote pour le maïs a été diffusée au printemps 1991. Environ 1 000 échantillons de sol ont été envoyés aux laboratoires par les agriculteurs au cours de la première année. Les études ont été prolongées afin qu'elles incluent la collecte des données qui seront nécessaires à l'établissement des recommandations d'azote pour la pomme de terre et l'orge. (UG)

Les chercheurs ont élaboré de nouvelles techniques pour prévoir les besoins en engrais des cultures de plein champ en Ontario. Ils ont confirmé que les extractants maintenant utilisés dans le programme d'analyses de sol sont aussi bons que d'autres et que, dans le cas du phosphore, ils sont bien meilleurs pour les sols de l'Ontario que les extractants utilisés dans des régions du sud ou de l'est de la province. En 1991, l'intégration des travaux de plusieurs années a permis de conclure qu'il est possible de réduire de quatre à deux le nombre d'extractants utilisés au cours des analyses de sol sans sacrifier l'exactitude. (UG)

Des études ont été menées en collaboration avec trois des collèges de technologie agricole pour déterminer l'influence des caractéristiques du sol sur la stabilité et la sensibilité à la teneur en eau. La texture du sol et la matière organique semblent jouer le rôle le plus important, le pH du sol jouant un rôle secondaire. La sensibilité à la teneur en eau augmente avec la teneur en argile et la stabilité globale augmente avec la teneur en argile et en matière organique. Ces observations ont une incidence importante sur les prévisions de la réponse de la stabilité structurelle du sol lorsque des mesures correctives sont envisagées, par exemple, l'introduction de fourrages dans les systèmes culturaux. (UG)

## Économie

Le MAAO finance des recherches en économie afin de mieux connaître la confoncture internationale ainsi que les pratiques de gestion financière des exploitations en Ontario.

D'après une étude sur l'importance des risques que comportent pour le revenu les modes différents de travail du sol et de lutte contre les mauvaises herbes, on a constaté que, sur les sols argileux, le labour à la charrue et le labour au chisel font moins varier le revenu que le semis sans travail du sol ou sur billons, mais que c'est l'inverse qui se produit sur les sols sableux. Les coûts totaux à l'hectare étaient plus élevés pour le labour à la charrue ou au chisel que pour le semis sans travail du sol ou sur billons à cause des frais de machine plus élevés. En revanche, les coûts variables à l'hectare

Reduced tillage systems could reduce labour costs by up to 61% annually when compared with mouldboard plough tillage. (UG)

A study examining the phasing out of discriminatory markups on Ontario wine, as required by the GATT, indicated that the actual procedure followed by the Ontario government to increase the markups of domestic wines to the level of imported wines generates substantial government revenues but reduces the demand for Ontario-produced wines. An alternative approach of reducing international wine markups down to Ontario levels would reduce government revenues but would maintain the demand and sales of Ontario wines. (UG)

Studies analyzing the economics of agro-forestry in Ontario's tobacco belt found that red oak trees would not be economically competitive with traditional field crops such as corn, beans and cereal grains, under a wide variety of economic circumstances. Nut-bearing trees, in contrast, were found to be quite competitive because they could generate both a cash crop from nuts and a value from lumber. (UG)

Studies analyzing international trade policies indicate that a failure in the GATT negotiations could lead to an intensified agricultural trade war. This trade war could place very large costs on individual countries and other nations, but would gain little in international market share. The agricultural trade war could, in turn, escalate to include non-agricultural trade, at great cost to all involved. (UG)

Research evaluating alternative techniques to assess the credit worthiness of agricultural loans utilized a variety of complex and simple methods to make this assessment. The results indicated that there was very little difference between the methods, implying that simple rather than complex methods are appropriate for assessing the credit-worthiness of agricultural loans. (UG)

The dynamics of structural change in the Ontario hog industry were examined through two different models, both indicating there will likely be approximately 60% fewer hog producers in Ontario by the turn of the century than at the beginning of 1990. (UG)

Results from a study involving 16 Ontario and 11 Michigan farrow-to-finish swine farms indicated many similarities in pig production and general management practices. The Michigan farms were slightly larger, and outperformed their Ontario counterparts in pigs weaned per sow per year and kilograms of pork produced per sow. (RCAT)

étaient plus élevés pour le semis sans travail du sol et le semis sur billons parce qu'il faut appliquer des herbicides de prélevée. Les systèmes de travail réduit du sol pourraient diminuer les frais de main-d'oeuvre jusqu'à 61 % annuellement, comparativement au labour à la charrue. (UG)

Une étude portant sur l'élimination progressive des différences de prix discriminatoires en matière de vin, exigée par le GATT, indique que la méthode actuelle suivie par le gouvernement de l'Ontario pour aligner le prix des vins canadiens avec celui des vins importés génère des recettes substantielles pour le gouvernement, mais réduit la demande de vins produits en Ontario. Une autre méthode de réduction des différences de prix réduirait les recettes du gouvernement, mais maintiendrait la demande et les ventes de vins ontariens. (UG)

Des études sur l'intérêt économique de l'agro-foresterie dans la région tabacole de l'Ontario ont permis de constater que les chênes rouges ne seraient pas économiquement compétitifs avec les cultures de plein champ traditionnelles comme le maïs, les haricots et les céréales, dans une large gamme de circonstances économiques. Les arbres portant des fruits à coque, par contre, se sont révélés assez compétitifs parce qu'ils peuvent générer des recettes tant par les fruits que par le bois. (UG)

Des études sur les politiques du commerce international montrent qu'un échec des négociations du GATT pourrait entraîner une recrudescence de la guerre des prix agricoles. Cette guerre coûterait très cher aux différents belligérants et à d'autres nations, sans permettre à aucun d'eux d'accroître sensiblement sa part du marché. La guerre des prix agricoles pourrait, à son tour, se propager aux produits non agricoles, et serait très dommageable pour tout le monde. (UG)

Des recherches portant sur des techniques de rechange pour apprécier la sovabilité des agriculteurs demandant des prêts ont mis en oeuvre des méthodes simples et des méthodes complexes. D'après les résultats, il y a très peu de différence entre les méthodes, autrement dit les méthodes simples conviennent aussi bien que les méthodes complexes pour évaluer la solvabilité des demandeurs de prêts. (UG)

La dynamique de l'évolution structurelle du secteur de production porcine en Ontario a été examinée selon deux modèles différents; tous deux indiquent que le nombre des producteurs aura baissé d'environ 65 % en Ontario d'ici à la fin du siècle, comparativement au début des années 1990. (UG)

Selon les résultats d'une étude portant sur 16 exploitations porcines de naissage-engraissement en Ontario et 11 exploitations semblables au Michigan, les pratiques d'élevage et de gestion générale sont très semblables. Les exploitation du Michigan étaient légèrement plus grandes que celles de l'Ontario, et obtenaient de meilleurs résultats du point de vue du nombre de porcelets sevrés par truie et par an et des kilos de porc produits par truie. (CTAR)

## Agricultural Research Projects

This inventory contains all agricultural research projects that were active during the fiscal year of 1991-92. All those listed were funded completely or in part by the Ontario Ministry of Agriculture and Food. Those at the University of Guelph were carried out under an agreement with the Ministry.

## AGRICULTURAL AND FOOD LABORATORY SERVICES

The Provincial Pesticide Residue Testing Laboratory is one of four sections of Agricultural and Food Laboratory Services Branch. The research objectives are to improve and amend pesticide registrations and recommendations in order to reduce residues below the negligible level of 0.1 mg/kg wherever possible. The physical dispersal, chemical breakdown, and microbiological degradation of pesticides and toxic metabolites are monitored to set pre-harvest intervals for application of the chemicals. This research adds to our general understanding of the fate of pesticides in the environment and food.

Studies on the hazards of re-entry into treated areas help minimize the risks in using pesticides. This research includes monitoring the exposure, absorption, and excretion of pesticides on those who use them and studying the effect of laundering clothing and disposal to help minimize the risk of applying these chemicals. Studies on culinary practices and cooking are being conducted to determine what residues can be removed or reduced by these means.

Monitoring studies are also conducted on fruits, vegetables, soil, tobacco, water and domestic and wild birds, animals and fish to examine trends in pesticides and other anthropogenic chemical contaminants.

| Project Title | Researcher |
|---|---|
| **Field Crops** | |
| Monitoring flue-cured tobacco and soils on 54 farms for pesticide residues and metal contents | Ripley, Burchat, Clegg, Zilkey |
| Rinsing of sprayers | Ripley, Clegg |
| Modelling pesticide dissipation | Ripley, Clegg, Ritcey, Burchat |
| Integrated weed management in white beans | Swanton, Clegg |
| **Food and Food Quality** | |
| Method development for drugs including sulfathiazole and other drugs | Chapman, Burchat, Ripley, Clegg |
| Monitoring sulfa residues in pork | Chapman, Ripley |
| Monitoring Ontario-grown fruit and vegetables for pesticide residues | Ripley, Burchat |
| Sources of PCP in animal tissues | Ripley, Clegg |
| Disappearance of pesticides from grapes made into wine | Ripley, Clegg, Burchat, McFadden |
| Monitoring animal tissues for pesticide residues and metals | Ripley, Luyken, Burchat |
| EBDC residues in lettuce | Ripley, Ritcey, Burchat |
| Researching residue behaviour in raw and processed fruit and vegetables | Ripley, Ritcey, Burchat |
| **Horticultural Crops** | |
| Dissipation of herbicide residues from onions and organic soils | Clegg, Ritcey |
| Studies on pesticides for minor crop registration | Ripley, Clegg, Burchat, Ritcey, Harris |
| Fungicides for protection of carrots against storage rots | Ripley, McDonald |
| Dissipation of insecticide residues from minor crops and ethnic vegetables | Ripley, McEwen, Ritcey, Harris |
| Dissipation of pyrethroids from muck crops | Ripley, McEwen, Ritcey, McDonald |
| Dissipation of fungicide residues from minor crops and ethnic vegetables | Ripley, Ritcey, Burchat |
| **Human Exposure** | |
| Reducing applicator exposure to herbicides | Clegg, Ripley |
| Following the changes in organochlorine residues | Rasper, Ripley |
| Monitoring and reducing IPM scout exposure | Ripley, Burchat |
| Reducing residues through culinary practices | Ripley, Ritcey, Burchat |
| Re-entry into treated crops | Ripley, Ritcey, Clegg, Burchat |
| **Soil, Water, and Waste Management** | |
| Metolachlor dissipation in the field | Clegg, Patni |
| Stability of pesticides in water | Clegg, Ripley |
| Monitoring shallow and deep wells for pesticides and anions | Ripley, Chapman, Clegg |
| Monitoring surface water for pesticides and anions | Ripley, Chapman, Clegg |

| Project Title | Researcher |
|---|---|
| Monitoring sludge amended soil for heavy metals | Suda, Clegg |
| **Livestock** | |
| Translocation of topically applied synthetic insecticide on bovine | Surgeoner, Ripley, Burchat |
| **Engineering** | |
| Immunoassay evaluation | Clegg, Burchat, Ripley |
| Mycotoxin residues in corn | Ewing, Schaafsma |
| Congener specific PCB analysis | Rasper, Ripley |
| Analytical method and development for new fungicides, insecticides and herbicides | Ripley, Clegg, Burchat |

## ALFRED COLLEGE OF AGRICULTURE AND FOOD TECHNOLOGY

Alfred College is located 65 km east of Ottawa on the Trans-Canada Highway, #17. It is in the heart of the highest concentration of francophones in the province and French is the language of administration and teaching at the College. It is also in one of the main milk-producing regions of Ontario where soils for the most part are of very productive clays; by their nature, however, they are poorly drained.

Research began at the college in 1983 with a project to resolve drainage problems in this clay soil. In the fall of 1985, another was begun to evaluate the use of mole drains in combination with 'French' drains. This research has been quite successful and further work is underway.

The College has crop demonstration plots, begun in 1984, and a maple bush in which demonstrations are given. The land base is 150 hectares.

| Project Title | Researcher |
|---|---|
| Yield and winter hardiness of alfalfa on specialized drainage systems | Weil, Natho-Jina, Chambers |
| Milkhouse effluent treatment | Weil, Malcolm |

## CENTRALIA COLLEGE OF AGRICULTURAL TECHNOLOGY

Centralia College is in the heart of Western Ontario's diverse agricultural region. In agronomy, researchers test new practices in production, such as different row widths and planting dates and the use of crop rotations and plow-down legumes, for white and coloured beans, soybeans for human and animal consumption, canola and rutabagas. New varieties are tested for traits such as their yield potential and pesticide screening trials are held. These data are used in selecting varieties and pesticides for registration and are the basis for Ministry production recommendations.

| Project Title | Researcher |
|---|---|
| **Food science** | |
| Alternate use of coloured beans | Currie |
| Utilization of white pea bean | Currie |
| **Agronomy** | |
| Rutabaga production and protection | Brolley |
| Vegetable production and protection | Brolley |
| Canola variety testing and management | Forrest |
| Cold tolerance during reproductive growth in soybeans | Forrest |
| Cultivar improvement in yellow eye bean | Forrest |
| Disease control in edible beans | Forrest |
| Dry edible bean variety testing and management | Forrest |
| Evaluation of soil management systems utilizing red clover for structure enhancement | Forrest |
| Lupin variety testing and management | Forrest |
| Soybean variety testing and management | Forrest |
| Corn variety trials | O'Toole |

| Project Title | Researcher |
|---|---|
| Weed control in corn | O'Toole |

| Project Title | Researcher |
|---|---|
| Weed control in field beans | O'Toole |

## ENGINEERING RESOURCES UNIT

Located in twelve offices across the province, staff of the Engineering Resources Unit within the Resources Management Branch are involved in a variety of applied and on farm projects to evaluate and demonstrate new technology. Research results often require refinement and adaptation to fit existing systems before the technologies can be utilized on the farm. By monitoring and interpreting these projects, engineers are able to implement new information more rapidly into the hands of the appropriate stakeholders in the agriculture and food sector.

| Project Title | Researcher |
|---|---|
| Design of a new ridge air inlet system for wide farrowing-nursery units for 700 to 10,000 sow complex | Choinière, Gingras |
| Indoor air quality and working environment inside agricultural buildings: What standards should Ontario adopt? | Choinière, Munroe |
| Automatically controlled natural ventilation in a modified environment dairy barn at Kemptville College | Choinière, Munroe, McKnight, Brunet |
| Knowledge-based decision support software for natural ventilation of livestock housing and greenhouses | Choinière, Munroe, Suchorski-Tremblay |
| Development and application of a mathematical model for natural ventilation of livestock housing and greenhouses | Choinière, Suchorski-Tremblay, Munroe, Tanaka |
| An investigation of the transient nature of hazardous conditions in swine barns due to manure gases released during slurry mixing and removal (OMAF/Agriculture Canada Project) | Clarke, Patni |

| Project Title | Researcher |
|---|---|
| Alternative cooling methods for sweet corn and cantaloupes | Fraser |
| Forced-air cooling of strawberries using various containers | Fraser, Cobbledick |
| Peach warming problems before and after the cold storage | Fraser, Cobbledick, Ridler |
| Strawberry warming problems before and after the cold storage | Fraser, Cobbledick, Ridler |
| Effects of alternative drainage methods for grapes on water quality and quantity | Fraser, Fisher, Cline |
| Development of manure storage and utilization program | Hilborn |
| Development of potential and guidelines for small diameter tile drainage systems | Hilborn |
| Development of radio controlled shutoff systems for directly connected manure application systems | Hilborn |
| Evaluation of macro-pore and surface pollutant paths for various methods of manure application | Hilborn |

## POLICY AND PROGRAMS DIVISION

The Division provides leadership in agriculture and food policy through excellence in information, analysis, advice and coordination. This mission will be fulfilled through effective management of human resources, effective communications, best possible information base, leadership in policy and programs, and strategic planning of future direction.

The Division was developed from the former Economics and Policy Coordination Branch and is composed of the Policy Analysis Branch and the Policy and Program Coordination Branch.

The Policy Analysis Branch serves the Minister, the Deputy Minister, other Divisions/Branches, other Ministers/Agencies, other governments, the agriculture and food industry and the public. The Branch assesses the economic implications of different agricultural and food policy choices by assembling and interpreting agricultural economic information. The Branch conducts research into farm costs and business management, marketing methods and agricultural policy. It also gathers and publishes a wide range of agricultural statistics, and monitors economic developments in the food processing, distributing and retailing sectors.

The Branch also provides daily farm market broadcasts for the media and producers. From the Ridgetown office, field staff carry on economic research projects and provide consulting services to farm organizations, individual farmers and processing industries.

The Policy and Program Coordination Branch expedites the legislative process of the Ministry. It focuses on policy and program development, gives guidance and policy coordination to the Ministry, government and industry.

The Branch is also responsible for research, analysis and service delivery in federal-provincial relations, strategic planning and program evaluation.

| Project Title | Researcher |
|---|---|
| Survey of custom farmwork rates in Ontario, 1991 | Burgess |
| Vegetable crops: estimated production costs, 1991 | Dickson, Burgess, Mckibbon, Veenstra |
| Greenhouse vegetable cost of production 1991/92 | Dickson, Veenstra |
| Ontario horticultural labour study, 1991 | Dickson, Veenstra |
| Apple, peach & grape: estimated establishment costs, 1991 | Mckibbon |
| Fruit crops: estimated production costs, 1991 | Mckibbon |
| Land rental rates in Ontario, 1991 | Rosenberg |
| Pullet cost of production study, 1991 | Rosenberg |

## HORTICULTURAL RESEARCH INSTITUTE OF ONTARIO

HRIO is situated in the midst of Ontario's, and indeed Canada's prime horticultural region. It is made up of four units: the Horticultural Experiment Station and Horticultural Products Laboratory at headquarters in Vineland Station, the Horticultural Experiment Station at Simcoe close to Lake Erie, and the Muck Research Station at Bradford in the Holland Marsh north of Toronto.Each unit has a specialized function, but the overall objective of the program is to develop crops and varieties which will help make Ontario more self-sufficient in these types of food, storage and processing technologies which will extend the market life of domestically grown produce, and mechanized crop management and energy conservation for efficient production.

At the Horticultural Experiment Station, Vineland, attention is focused on protected food crops, tender and small fruits, tree fruits, edible fungi, ornamentals and cut flowers, and plant nutrition for a variety of species. Including a grape sub-station, the land base is 90 hectares.

Researchers at the Horticultural Products Laboratory, Vineland, investigate storage handling, processing, and quality of harvested fruits, vegetables and ornamentals. The evaluation of cultivars from HRIO's breeding program and of those from other regions is a very important part of their work. The Laboratory is increasingly concerned, as well, with the development of further-processed, added value products.

The Horticultural Experiment Station, Simcoe, concentrates its efforts one-third on fruit and two-thirds on vegetables, a reflection of the commercial production in that area. Fruit research includes extensive work on apples as well as on berry fruits such as strawberries, highbush blueberries, raspberries, currants, and the recently introduced tayberry from Scotland. Vegetable research emphasizes the mechanical harvesting of processing crops, particularly tomatoes and cucumbers, field tomato breeding, and the epidemiology and control of diseases.

At the three-hectare Muck Research Station, research is focused on crops grown in the organic soils of the ancient lake bottom: chiefly onions, carrots, lettuce and celery. Cooperative studies are carried out with HPL on storage of these vegetables, and with the University of Guelph and Agriculture Canada on controls for various pests and diseases.

### Fruit

| Project Title | Researcher |
|---|---|
| Evaluation and development of analytical methods for determining nutrient status of plant materials | Cline |
| Fertilizer and soil management with apple | Cline |
| The use of paper mill sludge on agricultural land | Cline |
| Fertilizer and soil management with grape | Cline, Fisher |
| Soil management and fertilizer studies with peach | Cline, Miles |
| Trickle irrigation studies for horticultural crops | Cline, Miles Tehrani, Fisher |
| Coordinated small fruit trials in Ontario | Dale |
| Development of improved strawberry cultivars for fresh market and processing | Dale |
| Evaluation of wild *Fragaria virginiana* clones for useful characteristics for cultivar breeding | Dale |
| Management of small fruit crops | Dale |
| Apricot breeding and cultivar evaluation | Fisher |

| Project Title | Researcher |
|---|---|
| Breeding wine grapes adapted to Ontario conditions | Fisher |
| Freezing tests for cultivar/clonal and management evaluation | Fisher |
| Grape breeding for dessert cultivars adapted to Ontario climatic conditions | Fisher |
| Grape rootstocks for vinifera cultivars | Fisher |
| Grape rootstocks - scion/rootstock combinations for non-vinifera cultivars | Fisher |
| Grapevine population studies in relation to yield and quality | Fisher |
| Growth regulators in the vineyard | Fisher |
| Production of grape and wine adjustment program reports | Fisher |
| Rapid propagation of Sovereign Coronation grapevines | Fisher |
| Training systems for grape cultivars | Fisher |
| Vineyard management improvement for vinifera cultivars | Fisher |
| Vinifera cultivars and training combination trial | Fisher |
| Vinifera growers' survey | Fisher |
| Soil management, irrigation and summer pruning interaction on Riesling/3309 grapevines | Fisher, Cline |
| Leaf removal of vinifera grapes to reduce Botrytis bunch rot and to improve quality | Fisher, Guttler |
| Breeding clingstone peaches | Miles |
| Breeding field resistance of peaches to canker disease | Miles |
| Propagation methods for peach trees | Miles |
| Peach and nectarine cultivar evaluations | Miles |
| Trellised peach orchard studies | Miles, Cline |
| Evaluation of prunus rootstocks for peach | Miles, Layne |
| Control of cytospora canker disease in peach | Miles, Walker |
| Alternative thinning materials for apples | Schechter |
| Apple cultivar evaluation | Schechter |
| Apple rootstock evaluation | Schechter |
| Effect of growth regulators on apple chemical thinning | Schechter |
| Effect of nitrogen fertilization on dwarf apple trees | Schechter |

| Project Title | Researcher |
|---|---|
| Modelling apple tree and fruit growth | Schechter |
| Orchard factors influencing apple fruit quality | Schechter |
| Replant apple orchard | Schechter |
| Soil management trial | Schechter |
| Breeding for a seasonal succession of firm-fleshed, non-cracking, self-fruitful, black, sweet cherry cultivars and determination of incompatibility groups of selections | Tehrani |
| Breeding for early maturing European and Japanese plum cultivars and pollen compatibility studies with plums | Tehrani |
| Breeding sour cherry cultivars superior to Montmorency | Tehrani |
| Comparison of productivity and growth of the late maturing advanced European plum selections and cultivars | Tehrani |
| Cultivar and rootstock collection of cherries, pears and plums | Tehrani |
| Evaluation of 'Bosc' in combination with eight interstocks on quince A and C dwarfing rootstock in an ultra-density Tatura trellis training system | Tehrani |
| Evaluation of Bosc with seven quince dwarfing rootstocks | Tehrani |
| Evaluation of four pear cultivars on ten size-controlling quince rootstock in a high density planting | Tehrani |
| Influence of Colt, MXM#14, *Prunus mahaleb and Prunus mazzard* rootstocks on productivity and growth of sweet and tart cherry cultivars | Tehrani |
| Influence of different selections of *Prunus mahaleb* rootstock on productivity, growth of two tart cherry cultivars | Tehrani |
| Influence of rootstocks on performance of advanced self-fruitful selections and standard sweet cherry cultivars | Tehrani |
| Influence of rootstocks on productivity and growth of different European plum cultivars and early blue Vineland selections | Tehrani |
| NC-140 cooperative pear rootstock trial | Tehrani |
| NC-140 cooperative plum rootstock trial | Tehrani |
| NC-140 cooperative sweet and tart cherry rootstock trials | Tehrani |

| Project Title | Researcher |
|---|---|
| Performance of Anjou, Bartlett and Bosc on standard and Old Home X Farmingdale clonal rootstocks | Tehrani |
| Regional European plum cultivar and rootstock planting | Tehrani |
| Regional pear rootstock and cultivar trials | Tehrani |
| Rootstock and training studies with Anjou, Bartlett and Flemish Beauty pear cultivars on three quince rootstocks | Tehrani |
| Rootstock studies with Anjou, Bartlett, Bosc and Flemish Beauty cultivars on quince A and C | Tehrani |

## Vegetables and Edible Fungi

| | |
|---|---|
| Field tomato breeding | Brammall |
| Asparagus production and management | Loughton |
| Cole crop production and management | Loughton |
| Evaluation of non-traditional crops | Loughton |
| Crop management and fertility trials for muck vegetables | McDonald |
| Evaluation of summer and winter cover crops for the control of root knot nematode | McDonald |
| Herbicide trials and wind abatement for muck vegetables | McDonald |
| Management of muck soils | McDonald |
| Management of onion white rot | McDonald |
| Muck vegetable crop protection trials | McDonald |
| Muck vegetable cultivar evaluations | McDonald |
| Onion, carrot and celery storage trials | McDonald |
| Pesticide residue monitoring of muck vegetable | McDonald |
| Cover cropping strategy for first early potato production | McKeown |
| Potato management and physiology | McKeown |
| Seed potato management and physiology | McKeown |
| Sweet potato production and management | McKeown |
| Tomato management and physiology | McKeown |
| Influence of cultivars and other factors of production on yield and quality of peppers | O'Sullivan |
| Production practices for vine crops | O'Sullivan |
| Alternative technologies in mushroom cultivation | Rinker |
| Biological control of mushroom flies with entomopathogenic nematodes and microbial insecticides | Rinker |
| Commercial mushroom production | Rinker |
| Integrated disease management for verticillium disease of the cultivated commercial mushroom | Rinker |
| Mushroom compost - Substrate preparation and formulation | Rinker |
| Mushroom crop management - Casing soil studies | Rinker |
| Mushroom crop management - Response to supplementation | Rinker |
| Mushroom pest management | Rinker |
| Production of alternative fungi | Rinker |
| Speciality mushroom production | Rinker |
| Greenhouse tomato crop management | Straver |
| Hydroponics for greenhouse vegetable proction | Straver |
| Seedless greenhouse cucumber production | Straver |
| Development of methods to utilize existing tobacco kilns and/or tobacco storage barns for curing and/or storage of crops other than tobacco | VanHooren |
| Effects of post-harvest refrigeration and drying air temperature on ginseng root quality | VanHooren |

## Ornamentals

| | |
|---|---|
| Comparison of irrigation systems | Blom |
| Development of alstroemeria as a crop | Blom |
| Factors influencing poinsettia | Blom |
| Influence of HPS-lighting on freesia | Blom |
| Roses on rockwool | Blom |
| Defoliation of hydrangea | Blom, Smith |
| Caliper nursery tree production using Field-Grow fabric container and trickle fertigation | Chong |
| Effect of aerial and rooting environment on rooting of woody ornamental nursery crops | Chong |
| Growth substances and rooting media for propagation of woody ornamentals | Chong |
| Mulching of nursery trees | Chong |
| Non-chemical weed control in container culture | Chong |
| Nursery tree culture in above-ground wire basket containers | Chong |

| Project Title | Researcher |
|---|---|
| Nutrient recycling and run-off control in container culture | Chong |
| Field-Grow fabric container culture | Chong |
| Shade tree culture using pot-in-pot technique | Chong |
| Shade tree response to organic and mineral fertilizers | Chong |
| Soil amendments for containerized nursery crops: Recycling and reutilization of organic wastes | Chong |
| Woody ornamental propagation in plug trays | Chong |

## Food and Food Quality

| | |
|---|---|
| Controlled atmosphere storage of apples | Chu |
| Controlled atmosphere storage of pears | Chu |
| Development of a starch-iodine test guide for maturity evaluation of Ontario apples | Chu |
| Development of an ethylene measurement technique to determine apple harvest maturity | Chu |
| Low ethylene storage of apples | Chu |
| Low oxygen storage of apples | Chu |
| Post-harvest physiology studies on modified atmosphere packaged fruits and vegetables | Chu |
| Studies on cauliflower modified atmosphere storage | Chu |
| Analysis of chemical and physical indexes of quality of juice, wine, and table grape cultivars and selections | Fuleki |
| Anthocyanin pigment composition of horticultural crops grown in Ontario | Fuleki |
| Colour quality problems in horticultural crops and their products | Fuleki |
| Development of HPLC - based analytical methods for quality control in the food and beverage industry | Fuleki |
| Juice potential of commercial fruit cultivars | Fuleki |
| Ultrafiltration and reverse osmosis in beverage technology | Fuleki |
| Fruit loss components, compositional changes and effects on subsequent vine productivity of grapes used for icewine production | Fuleki, Fisher |
| Automated environment monitoring | Lauro |
| Automated environment monitoring | Lauro |
| Development of storage monitoring technology | Lauro |
| Energy aspects of storage | Lauro |
| Storage facilities operation and management | Lauro |
| Technical and economic evaluation of fruit and vegetable storage systems | Lauro |
| Engineering aspects of food processing | Lauro |
| Asparagus storage studies | Smith |
| Crucifer crop storage studies | Smith |
| Improvement of cranberry growing in Ontario | Smith |
| Onion storage studies | Smith |
| Strawberries - modified atmosphere packaging | Smith |
| Storage studies on ornamentals | Smith |
| Storage studies on shredded lettuce | Smith |
| Storage studies on stone fruit | Smith |
| Development of organic processing techniques for herbs and spices | Wang |
| Modified atmosphere packaging of minimally processed vegetables | Wang |
| Processing quality studies on berry crops | Wang |
| Processing quality studies on peaches | Wang |
| Processing quality studies on tomatoes | Wang |
| Value-added utilization studies on cherries | Wang |
| Packing studies on prepeeled potatoes | Wang |
| Processing studies on mushrooms | Wang |

## Pest Management and Disease Control

| | |
|---|---|
| Diseases of cole crops - Host-pathogen interactions and procedures for control | Brammall |
| Diseases of ginseng - Host-pathogen interactions and procedures for disease control | Brammall |
| Diseases of tomato - Host-pathogen interactions in selected disease systems | Brammall |
| Investigations on the chemical induction of disease resistance for the protection of transplanted vegetable crops from soilborne pathogens | Brammall |
| Studies on the control of diseases affecting sweet corn production in Ontario | Brammall |
| Vegetable pathology | Brammall |

| Project Title | Researcher |
|---|---|
| Insect and disease resistance and pest management in cole crops | Loughton |
| Biological control of brown rot of peach | McFadden |
| Biological control of bunch rot in grape | McFadden |
| Improved timing of fungicide sprays for control of gray mold in strawberry and evaluation of Botrytis for pesticide resistance | McFadden |
| Pesticide residues on commercially produced grapes, wine and grape juice | McFadden |
| Use of Brassica green manures for control of nematodes and soil borne diseases | McFadden |
| Reduced rates of herbicides for sweet corn | O'Sullivan |
| The development of herbicide programs for various horticultural crops | O'Sullivan |
| Weed control strategies for asparagus using fall-seeded rye | O'Sullivan |
| Effectiveness of methods recommended to eliminate green fixation in downdraft tobacco kilns | VanHooren |

## KEMPTVILLE COLLEGE OF AGRICULTURAL TECHNOLOGY

The oldest CAT college in Ontario, Kemptville was established in 1916 to demonstrate and teach modern methods of agriculture. In every decade since then, it has provided Eastern Ontario farmers with the technology and leadership that were needed to make food abundant and safe.

In the 60's, Kemptville lead the corn revolution. In the 70's and 80's, it provided the technology for growing soybeans and the diversification of farm production.

In the 90's, agronomy research emphasizes conservation of the soil and natural ways of growing to reduce herbicide and pesticide use. Horticultural research, which among other things has stimulated the growth of pick-your-own operations and strawberry production, has also turned to ornamentals. One aim is to provide expertise for the burgeoning lawn and garden enterprises.

Because Kemptville College has the highest producing dairy herd among research and educational institutions, it can lead the way in providing test information on new concepts for high producing dairy cows. Researchers have already been able to demonstrate the feasibility of a Total Mixed Ration, pioneer a colostrum management program and enhance heavy calf production and marketing across the country.

In the past decade, the Food Science and Technology section has increased its contribution to food and nutrition research, focusing on the development of dairy products and beef along with meat quality.

In addition to its traditional role of analysing trends in the farm economy and workforce, the Business Management section has been providing computer and management training for Eastern Ontario farmers and Caribbean countries.

Philosophically, Kemptville is headed for a systems approach to research, where all sections of the College work towards a sustainable and environmentally safe agricultural industry for Eastern Ontario. To this end, the library has expanded its role. Farmers and researchers will have access to data bases that can keep them current on food science and agriculture.

| Project Title | Researcher |
|---|---|
| **Animal Science** | |
| Assessment of the immune status of newborn calves and its effect on colostrum management | Drevjany |
| Development of a quick quantitative method for the content of immunoglobulins in the blood of neo-natal calves | Drevjany |
| Development of a replacement heifer raising program suitable for Eastern Ontario conditions | Drevjany |
| Evaluation of chemical, physical and textural properties of veal and beef | Drevjany |
| Using Denco test to identify cows in need of supplementary energy | Drevjany |
| Alternative bases for dairy free stalls | McKnight |
| Effect of frequency of feeding a modified TMR on production and health in high producing dairy cows | McKnight |
| Effect of long-stem hay on performance of heavy calves | McKnight |

| Project Title | Researcher |
|---|---|
| **Field Crops** | |
| Comparison of chisel and moldboard plows with different crop rotations | Curnoe |
| Crop input comparisons on corn | Curnoe |
| Improving the degraded structure of fine textured soils with deep tillage and grass and legume crops | Curnoe |
| Liquid or composted manure applied to soil for corn production | Curnoe |
| Nitrogen rates on spring wheat and barley | Curnoe |
| Barley variety evaluation | Hoekstra |
| Genetic breeding of hull-less (naked) oats | Hoekstra |
| Hybrid corn evaluations for grain | Hoekstra |
| Oat variety evaluation | Hoekstra |
| Winter wheat variety evaluation | Hoekstra |
| Broadleaf weed control in barley | MacDonald |
| Broadleaf weed control in soybeans | MacDonald |
| Comparison of tillage methods with respect to weed control treatments | MacDonald |
| Imazethapyr efficacy evaluation plan | MacDonald |
| Nutsedge control | MacDonald |
| Nutsedge control in soybeans | MacDonald |
| Post-emergent grass control in soybeans | MacDonald |
| Post-emergent herbicide evaluation in corn | MacDonald |
| Post-emergent herbicide treatments in corn | MacDonald |
| Pre-emergent herbicide treatments in soybeans | MacDonald |
| Pre-plant herbicide treatments in soybeans | MacDonald |
| Quackgrass control | MacDonald |
| Soybean safety with clethodim | MacDonald |
| Tillage versus weed control in soybeans | MacDonald |
| Cultivar testing of natto soybeans and early lines of soybeans | Madill |
| Plant population studies of soybeans to assess reduced stands on yield potential | Madill |
| Registration and performance testing of early cultivars of soybeans | Madill |
| Registration and performance testing of forage legumes and grass cultivars | Madill |
| Risk of frost vs. yield | Madill |

| Project Title | Researcher |
|---|---|
| Early planting dates of soybeans to assess influence of megalac on milk production by high producing cows in early lactation - effects of megalac on grain palatability and production costs | McKnight, Wheeler |
| Effect of dietary zinc methionine supplementation on somatic cell counts and mastitis incidence | McKnight, Wheeler |
| Investigation of installation, cost and durability of four manger surfaces in a tie-stall dairy barn | McKnight, Wheeler |
| **Horticultural crops** | |
| Asparagus variety trial since 1986 | Langenberg |
| Ontario early potato variety trial | Langenberg |
| Ontario regional potato variety trial | Langenberg |
| Sweet corn Se cultivar trial | Langenberg |
| Sweet corn Sh-2 cultivar trial | Langenberg |
| Sweet corn Su cultivar trial | Langenberg |
| European corn borer control in sweet corn | Morton |
| Evaluating mowing techniques for clone vs. seedling lowbush blueberries | Morton |
| Evaluation of selected apple rootstock cultivar interactions for eastern Ontario conditions | Morton |
| Identification of suitable lowbush blueberry lines or cultivars for production in eastern Ontario | Morton |
| Yield evaluation and observation trials for strawberries | Morton |
| Yield evaluation and observation trials for raspberries | Morton |
| **Ornamentals and Turfgrass** | |
| Evaluation of wild roses | Langenberg |
| Turf cultivar evaluations | Morton |
| Turfgrass cultivar performance trials | Morton |
| Wildflower trials | Pearson |
| Environmental landscaping | Pearson, Morton |
| **Maple projects** | |
| Concentration of maple sap by reverse osmosis -- an evaluation of available membrane types | Langenberg |
| Evaluation of growth rate of the seedlings (Ulmus americana "Liberty") at various Ontario locations | Langenberg |

| Project Title | Researcher |
|---|---|
| Evaluation of vigor of sugar maple (Acer saccharum) vs. black maple (Acer nigrum) | Langenberg |
| **Communications and business management** | |
| Development and analysis of agricultural recording and management systems in selected Caribbean nations | Matura |
| Development of manuals and procedures training agricultural extension personnel in selected Caribbean nations | Matura |
| **Agricultural engineering** | |
| Remodelling of natural ventilation systems (Demonstration) | Brunet |

| Project Title | Researcher |
|---|---|
| **Food science** | |
| Thermal precipitation of proteins from milk whey blends | Hunter |
| Goat milk cheese processing demonstration project | Hunter, Reasbeck |
| Binding and texture in restructured beef steaks | Johnson, Reasbeck |
| Evaluating the chemical, textural and sensory properties of veal and beef | Johnson, Reasbeck, Drevjany |
| Sensory evaluation, product and recipe development for healthier lifestyle choice | Reasbeck, Stradler, Forbes |
| Photographs of ground meat patties for use in identifying risk factors for infections with E. coli | Reasbeck, Wilson |
| Work site heart health promotion program for blue collar workers - one year follow up results | Tracy |
| Evaluation of a new chewiness scale for sensory panel training using objective and sensory correlates | Wynne |

## NEW LISKEARD COLLEGE OF AGRICULTURAL TECHNOLOGY

New Liskeard, the Ministry's most northerly college, has developed a comprehensive research program to assist farmers in this particular area. Crop testing sites have been developed in the districts of Rainy River and Thunder Bay to give farmers in the Northwest of the Province recommendations suitable to their conditions. An Agronomy Research Laboratory has been constructed as well on the New Liskeard campus, facilities which will enhance the research program there.

Research is carried out in beef cattle, field and horticultural crops, and farm management. The cow-calf herd was expanded recently to allow for a more wide-ranging program on nutrition, breeding efficiency, and feeding animals on pasture. This reflects the importance of this industry in Northern Ontario. Along with agronomic research, chiefly in barley, oats, and forages, horticultural studies in berries, sweet corn, and cole crops are helping farmers diversify.

| Project Title | Researcher |
|---|---|
| **Agronomy** | |
| Protein crop evaluation | Heard |
| Forage grass cultivar evaluation program | Skepasts |
| Gene pool (early) corn test | Skepasts |
| Intensive barley production | Skepasts |
| Red clover seed production in northern Ontario | Skepasts |
| Canola variety testing program | Skepasts, Rowsell |
| Field crop evaluation program for northeastern Ontario | Skepasts, Rowsell |
| Field pea variety testing program | Skepasts, Rowsell |

| Project Title | Researcher |
|---|---|
| Forage legume cultivar evaluation program | Skepasts, Rowsell |
| Barley variety testing program | Skepasts, Rowsell, Heard |
| Flax variety testing program | Skepasts, Rowsell, Heard |
| Oat variety testing program | Skepasts, Rowsell, Heard |
| Soybean variety testing program | Skepasts, Rowsell, Heard |
| Wheat variety testing program | Skepasts, Rowsell, Heard |

| Project Title | Researcher |
|---|---|

## Soil, Water & Waste Management

| | |
|---|---|
| Long-term sustainable crop rotation | Heard |
| Soil fertility investigation of nitrogen, sulphur, phosphorus and lime on forage and cereal production | Heard |
| Nitrogen fertilization of canola in northeastern Ontario | Rowsell |
| Residual nitrogen from various sources | Rowsell |
| Response of barley and alfalfa to limestone in northern Ontario | Rowsell |
| Influence of *Penicillium bilaji* on phosphorus uptake by barley and alfalfa | Rowsell, Heard |
| To investigate the establishment, subsequent growth and erosion control potential of certain tree and shrub species on gully and stream banks | Skepasts |
| Effect of rate of nitrogen application on barley and wheat | Skepasts, Rowsell, Heard |

## Horticultural crops

| | |
|---|---|
| Berry crop observation trials | Hughes |
| Biennial cropping of raspberries | Hughes |
| Early generation seed potatoes production by the SPUD lab | Hughes |
| Sweet corn cultivar trials | Hughes |
| The effects of floating row covers on strawberry production | Hughes |
| The effects of floating row covers on sweet corn production | Hughes |
| The effect of mulches and tunnels on cucumber production | Hughes |

| Project Title | Researcher |
|---|---|

## Dairy

| | |
|---|---|
| Performance and economic effects of deworming suckling calves | Gumprich |
| Performance and economic effects of feeding milk replacer in place of whole milk to dairy calves | Gumprich |
| Performance and economic effects of replacing soybean meal with whole roasted soybeans for high producing dairy cows | Gumprich |
| Stray voltage effects on dairy cows | Gumprich |

## Beef

| | |
|---|---|
| Supplementing growing heifers on pasture | Gumprich |
| Early versus late castration of beef calves | Gumprich |
| Implanting beef calves with Ralgro | Gumprich |

## Sheep

| | |
|---|---|
| Reproductive efficiency, feed lot performance and carcass composition of lambs from prolific and standard breeds of sheep | Sharpe |
| Sheep grazing weeds in a spruce plantation | Sharpe |
| Comparison of different methods of handling and feeding forages in a sheep operation | Sharpe, Hawkins |
| Species comparisons of legume grass mixtures for sheep pasture in Ontario | Sharpe, Skepasts |

## Engineering

| | |
|---|---|
| Natural air grain drying | Hawkins |

# RIDGETOWN COLLEGE OF AGRICULTURAL TECHNOLOGY

Southwestern Ontario is an agriculturally intensive region, home to one-third of the province's total agricultural production. It has the highest heat unit range in Canada, a favourable climate and a broad spectrum of fertile soils. The year 1992 marks the 70th year that research programs have been conducted at Ridgetown - first as the Western Ontario Experimental Farm (1922) and later as Ridgetown College of Agricultural Technology (1968). These research programs continue to reflect and facilitate the growth of the agricultural industry in the southwest.

Since the majority of the region's farmland is planted in cash crops including soybeans, corn and winter wheat, grower access to superior crop varieties and regional production guidelines is essential. The College operates trial sites throughout the region to evaluate corn hybrids and cultivars of cereals, perennial forages, field beans, and soybeans for licensing and for recommendation to producers. A very productive soybean breeding program and many fertility, cover crop, tillage and rotation experiments are conducted both on and off campus.

The main emphasis of Ridgetown College's horticultural program is to develop economically and environmentally sustainable production methods. Research is conducted on processing tomatoes, peppers, cole crops, sweet corn, and various fruit crops, evaluating regional adaptability as well as plant establishment methodologies.

Ridgetown College is recognized internationally for its crop protection research, which is directed towards both conventional efficacy studies as well as environmental sustainability.

Agricultural engineering studies have concentrated on pesticide application techniques with the testing of various types of sprayers and nozzles to reduce pesticide use through better targeting.

RCAT's weed control programme seeks to improve control of a broad spectrum of weeds as economically as possible stressing crop safety and minimal effect on the environment.

The insects and disease programmes have continued to develop strategies and methods for improved application of pesticides in order to reduce the frequency and number of sprays thus reducing the total amount of pesticide usage. Where possible cultivar resistance and new chemical candidates are tested for control of costly pests such as European Corn Borer or Fusarium corn ear mould.

Applied livestock research is also carried out on both swine and cattle. The swine program concentrates on developing management strategies to convert domestic feedstuffs into lean pork in a manner which maximizes production efficiency, with a high standard of animal welfare.

Ridgetown is the only Ministry College carrying out beef research for growing and finishing animals. Programs concentrate on feeding and nutrition, and are developed in cooperation with the University of Guelph. A limited but effective dairy research program is carried out complementing the College education programs, and again specializing in nutrition and management studies. The purebred Holstein herd has consistently been one of the highest producing herds in Ontario.

Research in agricultural economics concentrates upon the development of information to improve producer marketing strategies for the major crop and livestock commodities. Significant new data base development programs were initiated which will provide input for national and provincial agricultural policy formulation.

| Project Title | Researcher |
|---|---|
| **Animal Production** | |
| Causes of preweaning piglet mortality | DeSchutter |
| Controlled feeding programs for grower/finisher pigs | DeSchutter |
| Effectiveness and profitability of various feeding programs for young pigs | DeSchutter |
| Evaluating alternative feedstuffs for swine | DeSchutter |
| Investigations with mould-contaminated corn | DeSchutter |
| The effectiveness of pST implants in improving performance of pigs 70 to 101 kg | DeSchutter |
| The impact of slaughter delays on dressing percent and carcass weight of market pigs | DeSchutter |
| Computer software development, livestock enterprise models for profit and sundry software development analysis | DeSchutter, Fitzgerald, Morris, Osborne |
| Effect of diet form and energy content on animal performance and carcass traits of growing and finishing beef steers | Fitzgerald |
| Effect of protein levels in finishing diets of steers deficient in ruminal escape protein in their diets in the growing period | Fitzgerald |
| Evaluation of product quality in feedlot animals | Fitzgerald |
| Alternative welfare housing systems for breeding, gestating swine | Morris, Underwood |
| Two-tiered pens for growing pigs | Morris, Underwood |
| **Economics** | |
| Agricultural options usage versus alternative marketing methods | Doidge |
| Analysis of Ontario cash corn and soybean prices cycles | Doidge |
| Analysis of Ontario elevator buying/selling price spreads and Ontario basis | Doidge |
| Impact of the corn countervail duty on the Ontario corn price determination process | Doidge |
| Implication of U.S. agricultural programs and policy for Ontario agriculture | Doidge |

| Project Title | Researcher |
|---|---|
| Assessment of human resources management in Ontario agricultural production | McEwan |
| Comparison of Ontario and Michigan farrow-to-finish costs and production parameters | McEwan |
| Ontario data analysis project: Swine | McEwan |
| Development of computerized budgeting and management aids for agricultural use | Ross |
| Economics of environmental control in greenhouses | Ross |
| Impact of the goods and services tax and other tax policies on primary producers in agriculture | Ross |
| Potential for, and the economics of, the use of computers and related electronic equipment in agriculture | Ross |

## Engineering

| | |
|---|---|
| Vegetation control in drainage ditches | Sojak |
| The effect of environmental influences on pork production under various housing/penning systems | Underwood |
| To improve the application targeting of crop protection chemicals | Underwood |

## Field Crops

### *Grain*

| | |
|---|---|
| Tissue analysis for nutrient content as affected by fertilizer practices (nitrogen and phosphorus) | Johnston |
| Tissue analysis for nutrient content as affected by various fertilizer and production practices | Johnston |
| Hybrid corn evaluation for grain and forage | Scheifele |
| Production studies in grain corn | Scheifele |
| Cereal management | Smid |
| Evaluation of cereal cultivars | Smid |

### *Forage*

| | |
|---|---|
| Field testing and evaluation of hay preservatives for preservation effectiveness of soft core large round bales of alfalfa hay in southern Ontario | Scheifele |
| Forage varieties and management | Scheifele |

### *Proteins and Oilseeds*

| | |
|---|---|
| Alteration of fatty acids in soybeans | Ablett |
| Cultural studies in field beans | Ablett |
| Cultural studies in soybeans | Ablett |
| Development and evaluation of soybean cultivars | Ablett |
| Evaluation of field bean types and cultivars | Ablett |

## Horticultural Crops

### *Fruit*

| | |
|---|---|
| Cultivar evaluations in apples, tender fruit and small fruit crops | Sikkema |
| Cultivar, rootstock and trellis system evaluations in vinifera crops | Sikkema |

### *Vegetables*

| | |
|---|---|
| Breeding and cultivar evaluation of processing peppers | Loewen |
| Breeding and cultivar evaluation of processing tomatoes | Loewen |
| Tomato/pepper plug plant research | Pitblado |
| Cultural management studies in vegetables | Sikkema |
| Cultural management studies of plug tray vegetables | Sikkema |
| Cultural management studies of sweet corn | Sikkema |

## Pest Management and Disease Control

| | |
|---|---|
| Effect of herbicides on weed control and crop response in vegetable and fruit crops, turf, ornamentals and windbreaks | Brown |
| Effect of herbicides on weed control in field and sweet corn | Brown |
| Studies in the control of specific weeds | Brown |
| An assessment of the significance of plant parasitic nematodes in processing tomatoes throughout Essex and Kent counties | Pitblado |
| Disease control in horticultural crops | Pitblado |
| Insect control in horticultural crops | Pitblado |
| Insect and disease control in field tomatoes | Pitblado |
| Rearing European corn borers | Pitblado |
| Control of seed mould to improve soybean seed quality | Schaafsma |
| Disease control in field crops | Schaafsma |
| Foliar insect control in field crops | Schaafsma |
| Insecticide placement technology | Schaafsma |

| Project Title | Researcher |
|---|---|
| The control of Fusarium ear mould in field corn | Schaafsma |
| Validation of economic thresholds for potato leafhoppers on dry beans | Schaafsma |
| Herbicides in the control of specific weeds | Shaw |
| Weed control in beans | Shaw |
| Weed control in cereals and forages | Shaw |
| Weed control in vegetable crops | Shaw |
| Weed management systems in reduced-till field crops | Shaw |

| Project Title | Researcher |
|---|---|
| **Soils, Water and Waste Management** | |
| Crop rotations and cover crop effects on erosion control, tomato yields and soil properties in southwestern Ontario | Johnston |
| Agroforestry research in southwestern Ontario | Nanni |
| Nitrogen research with corn using conservation tillage | Stevenson |
| Nitrogen research with winter wheat | Stevenson |
| Phosphorus and potassium soil test calibration research with corn | Stevenson |
| Crop rotation effects on crop yields and soil properties in southwestern Ontario | Young |
| Energy conservation in tillage and residue management for crop production in southwestern Ontario | Young |

## UNIVERSITY OF GUELPH

For over a century, the Ontario Agricultural College, the Ontario Veterinary College, and since the 1960's, other Colleges and the Equine Research Centre at the University have run research programs on behalf of the Ministry. The nature of these programs has changed a great deal over the years, and the scope has broadened dramatically. New disciplines such as environmental biology, plant and animal biotechnology, and energy management have been introduced to complement traditional ones such as animal husbandry and horticulture.

In the early years, research and demonstrations were held on what is now the University campus. Now, much of this work has been moved to the seven experimental farms owned by the Ministry and run, under contract, by the University: Alma (aquaculture), Arkell (swine, poultry, engineering, environmental biology), Cambridge (horticultural crops, turf management, pest management), Elora (beef, dairy, field crops, soils), Guelph (agroforestry), Ponsonby (animal health), and Woodstock (field crops). The main areas emphasized in each of Guelph's agricultural research programs are listed below followed by the titles of current projects within each program.

| Project Title | Researcher |
|---|---|
| **Animal and Poultry Production and Health Management** | |
| ***Beef*** | |
| Alfalfa silage / grain phase feeding | Allen, Ball, Buchanan-Smith |
| Bovine muscle metabolism and meat quality | Ball |
| The use of dietary supplement of anti-inflammatory agents in reduction of stress and susceptibility to lung diseases in cattle | Bray |
| Increasing the protein utilization in alfalfa/grass silages | Buchanan–Smith, Mowat |
| Chromium for stressed feeder calves | Mowat |

| Project Title | Researcher |
|---|---|
| Improving evaluation procedures for components of economic merit | Schaeffer, Wilton |
| ***Dairy*** | |
| The effect of forage particle size and source of fibre on rumination and productivity of early lactating dairy cattle fed silage-based rations | Allen, Buchanan-Smith, Grieve |
| Effect of ration protein degradability on lactation response | Buchanan-Smith, Grieve |
| Growth rates, composition and performance of dairy replacement heifers | Buchanan-Smith, Grieve, McBride |
| MOET, DOC and IV : experimental and simulation analysis in herds of varying sizes for maximum genetic improvement | Burnside |

| Project Title | Researcher |
|---|---|
| Comparison of dairy cows of high genetic merit for production with varying size | Burnside, Burton, McBride |
| Genetic and environmental causes of immunoglobulin levels in Canadian dairy cattle | Burnside, Burton, Wilkie |
| Evaluation of Holstein-Friesian A.I. sires for stillbirths and ease of calving | Burnside, Schaeffer |
| Efficacy of recombinant growth hormone (rbGH) for lactating cows | Burton |
| The effects of plant and fish protein in pre-ruminant calf diets on growth, health and immunological parameters | Burton |
| Effect of feeding varying doses of bambermycins (flavomycinR) on production responses, reproduction and health of dairy cows and heifers | Burton, McBride |
| Characterization of genes coding for rumen fungal fibrolytic enzymes | Forsberg |
| Antibodies with endocrine activity: Alternative methods for increasing animal performance. | Gibbins, Walton, Wilkie |
| Somatotropin in young dairy sires as a predictor for genetic merit of milk production | Hacker |
| Methods for genetic improvement of dairy cattle | Kennedy |
| Selection bias and animal evaluation methodology | Kennedy, Schaeffer |
| Is insufficient progesterone a cause of reproductive failure in dairy cows? | King, Leslie, Walton |
| Direct oocyte collection (DOC) and in-vitro fertilization (IVF) in cattle | Walton |
| Antibodies with endocrine activity: Alternative methods for increasing animal performance | Walton, Wilkie |

## *Equine*

| Project Title | Researcher |
|---|---|
| Study of biology of pregnancy establishment in horses | Betteridge |
| Ultrastructural and immunohistochemical studies of the origin of the equine capsule - Blastocoelic fluid analysis | Betteridge |
| An evaluation of diagnostic techniques in gastric ulceration in the foal | Dobson, Barker |
| Evaluation of the diagnostic value of real time ultrasound in the identification of subclinical suspensory desmitis in the standardbred | Dobson, Bonnett, Horne |
| Bone autoinduction in horses | Douglas |
| Studies of the growth of foals | Douglas |
| Cervical vertebral malformation (Wobbler syndrome) | Green |
| Developmental orthopedic disease in Hanoverian horses | Green, Hurtig |
| Abnormal bone growth in copper-deficient foals | Hurtig, Dobson |
| The effect of prenatal nutrition on developing bone and cartilage in the equine fetus | Hurtig, Dobson, Burton |
| A noninvasive technique for measurement of the strength of the cannon bone | MacKenzie |
| Cardiopulmonary effects of hypercapnia during constant volume controlled intermittent positive pressure ventilation (IPPV) in the horse | McDonell |
| Determination of anaerobic threshold in the horse during an incremental treadmill test | McDonell, Staempfli, Young |
| The cost of breathing in horses | McDonell, Staempfli, Young |
| Computerized analysis of equine breeding farm level data for the assessment and establishment of attainable targets of reproductive efficiency within the equine breeding industry | Meyers |
| A field investigation of early embryonic mortality and non-pregnancy on selected breeding farms in Ontario | Meyers, Bonnett, McKee |
| Purification of protective antigens of rhodococcus equi | Prescott |
| Is relaxin essential for ovulation in the mare | Porter |
| Analysis of achrosomal status and freezing methods on the viability of frozen thawed stallion spermatozoa | Samper |
| Establishment of mare oviductal cell cultures and their use in evaluating stallion seminal extenders and sperm membrane integrity | Samper |
| Strongyles in equines: biology, pathogenesis, epidemiology and control | Slocombe |
| Role of *clostridium cadaveris* in severe colitis in horse | Staempfli, Prescott |
| Scintographic determination of gastric emptying in pony foals | Tremblay, Dobson |
| Peritoneal fluid analysis in periparturient mares | Trout, Meyers |

| Project Title | Researcher |
|---|---|
| Effect of inhaled corticosteroid on pulmonary function, airway inflammation and responsiveness in horses with an asthma-like syndrome (heaves) | Viel |
| Etiology of respiratory infections in foals on large breeding operations in Southern Ontario | Viel |
| Histamine inhalation challenge in horses with exercised induced pulmonary haemorrhage | Viel |
| Respiratory infections in southern Ontario foals: causative agents, effects of therapy and long term outcome | Viel |
| A study into the characterization and treatment of airway hyperresponsiveness in standardbreds with reduced excercise tolerance | Viel, McDonell |
| Characterization and comparison of *in vivo* and *in vitro* airway responsiveness in recurrent airway obstruction | Viel, McDonell |
| Laser Doppler velocimetry for bronchoscopic assessment of bronchial mucosal blood flow in horses | Viel, McDonell |
| Immunocytochemical identification of equine influenza virus and equine herpes virus type I in experimentally infected horses | Viel, Willoughby, Lang |
| A study of rhinovirus infection of horses | Willoughby |
| Infectious respiratory diseases in horses: studies of the agents involved and methods for control | Willoughby, Viel, Thorsen |
| Pathogenesis and immunity in Rhodococcus equi infections | Yager |
| Measurement of total respiratory impedance in horses at low frequencies | Young |

### *Poultry*

| | |
|---|---|
| Salt reduction in processed meat products | Barbut |
| Measuring the behavioural needs of poultry | Duncan |
| The effects of non-traditional lighting on poultry behaviour and welfare | Duncan |
| Development of methods of gene transfer in domestic birds | Etches |
| Isolation, identification and characterization of reproductive hormones in domestic birds | Etches |
| Lighting regimes for turkey toms | Etches |
| The control and manipulation of egg protein synthesis in domestic birds | Gibbins |
| Study of poultry feeding motivation | Hurnik |
| Development of feeding systems for poultry | Leeson |
| Efficacy of growth promoters, antibiotics and anticoccidials for poultry | Leeson |
| Manipulation of growth in broiler chickens and turkeys | Leeson |
| Poultry egg production curves | McMillan |
| The environment and efficiency of poultry production | Morrison |
| Factors regulating the development of a single functional ovary in poultry | Squires |
| Investigation of the molecular basis for fatty liver hemorrhagic syndrome | Squires |

### *Swine*

| | |
|---|---|
| Amino acid metabolism in pigs | Ball |
| Body composition and meat quality in pigs | Ball |
| Effect of amino acid supplementation on stress, meat quality and body composition in swine | Ball |
| Evaluation of porcine somatotropin (PST) for improved performance and carcass quality in finishing pigs | Ball, Bowman, Hacker |
| Exploitation of exogenous and endogenous growth regulators for pork production | Bayley |
| High levels of food intake, growth rate and efficiency of carcass deposition | Bayley |
| Factors affecting the fertility of boar semen | Buhr |
| Controlling luteal function in swine | Buhr |
| An investigation of seasonal infertility of swine | Friendship, Hacker, Martin, Raeside |
| Enhancing cyclic activity of the post-weaned sow by tyrosine supplementation | Hacker |
| Growth promotion in pigs using immunization against somatostatin | Hacker |
| Reducing stillbirths and improving piglet viability | Hacker |
| Effect of management parameters on dust and gas levels in a growing-finishing barn | Hacker, Morrison, Ogilvie |
| Development and testing of new housing system (H-M system) for dry and gestating sows | Hurnik |
| Study of feeding motivation in newly weaned piglets | Hurnik |
| Testing and development of alternative farrowing units for sows | Hurnik |

| Project Title | Researcher |
|---|---|
| Genetic improvement of pigs | Kennedy |
| Regulation of reproductive function in pigs | King, Walton |
| Application of microwave technology to rearing young piglets | Morrison |
| An investigation of the anabolic properties of polyamines in swine | Smith |
| Regulation of androstenone biosynthesis and control of boar taint | Squires |
| Evaluation of enzyme additions to swine diets | Young |

### *Biomedical Sciences*

| | |
|---|---|
| 3-Methylindole-induced pulmonary edema and metabolic basis of prolonged pulmonary disease in ruminants | Atwal |
| Testicular morphogenesis and subfertility related to twinning in cattle | Basrur |
| Development of biotechnological methods of embryo manipulation for the advancement of animal breeding strategies | Betteridge, Johnson, Wildeman, Blecher |
| Study of antibacterial residues in milk-testing procedures | Black |
| A study to design improved systems for monitoring drug residues in slaughter animals | Black, McEwen, Meek |
| Investigation into effects of toxins on disease resistance of cattle: Development of the SCID-bovine mouse, a murine model for evaluating immunotoxicity in cattle | Boermans |
| Cytokine induced endothelial alterations | Coomber |
| Immunopharmacological regulation of bovine inflammatory cells | Conlon |
| A study of the effects of levamisole on cellular responses to a respiratory virus in cattle | Conlon, Black |
| Assessment of immunocompetent cells within the pregnant mammalian uterus | Croy |
| Development of the immune reconstituted SCID and SCID-beige mouse as a generally applicable model for veterinary and agricultural research | Croy, Stirtzinger, Yager, Percy, Betteridge, Boermans, Butler, Etches |
| Analysis of the intersex syndrome(s) in swine | Fisher, Partlow |
| The hemostatic mechanism in cattle: significance of the Factor XI protein | Gentry |
| Adaptation of the hair follicle nuclear aberration assay for use with human hair exposed in vitro | Goldberg |
| Investigation into the control of rumen function and food intake in ruminants | Grovum |
| Dermal-epidermal and other interactions in differentiation and disorders of mammalian skin | Hardy-Fallding |
| A study of mechanisms by which Pasteurella Haemolytica cytotoxin induces contraction of bovine airway smooth muscle | Harris, Yamashiro |
| The embryonic genome and its expression during early development | King |
| Effect of glucocorticoids on follicular and oocyte development in the pig | Liptrap |
| Is relaxin a neural lobe hormone in the pig? | Porter |
| Steroid biosynthesis in the testes of the boar | Raeside |
| Investigations of approaches to improving superovulation in Holstein heifers using a potent LHRH antagonist and recombinant bovine somatotrophin | Rieger, Johnson, Walton |
| Accumulation of thallium in the egg shells of domestic fowl | Robinson |
| A study on gene transfer and molecular genetic markers to improve livestock productivity and health | Wilderman, Croy |

### *Pathology*

| | |
|---|---|
| Pathogenicity of Cochlosoma anatis to ducklings | Barker, Hunter, Fernando |
| Factors influencing the distribution of Lyme disease in Ontario | Barker, Surgeoner, McEwen |
| Cell biology and evolutionary relationships of apicomplexan parasites | Barta |
| Determination of course of infection of Cryptosporidium spp. infections in severe combined immune deficient (SCID) mice and potential for treatment with hyperimmune bovine colostrum. | Barta |
| Host parasite interaction in the coccidia - pathogenetic | Fernando |
| Significance of neoplasia in wild fish in Lake Ontario | Hayes, Ferguson |
| Influence of Ureaplasma diversum on bovine embryonic development and mortality | Hayes, King |
| Investigation into reproductive failure and normal mortality on mink ranches | Hunter |

| Project Title | Researcher |
|---|---|
| Development of a serological test and DNA probe to detect bovine immunodeficiency-like virus and their use in studies of prevalence and pathogenicity. | Jacobs |
| Tissue factors influencing expression of bovine leukemia virus | Jacobs |
| Right ventricular failure and ascites in broiler and roaster chickens | Julian |
| Studies on lameness and leg problems in broiler chickens and turkeys | Julian |
| Effect of plasma membrane composition on the susceptibility of porcine embryos to damage by cold stress (Pilot study) | Leibo, Plante |
| H. somnus pathogenesis and immune mechanisms of cattle | Little |
| Investigation of sudden death syndrome in turkeys | McCutcheon |
| Ureaplasma diversum as a cause of infertility in cattle | Miller |
| Effects of ureaplasma diversum on bovine embryos: In vitro studies | Miller, Fernando |
| Reproductive performance in the Guelph Yorkshire high-low immune response pig lines | Miller, Plante |
| Correlation of cytokine-binding mechanisms and early embryonic death in swine | Plante |
| IEnteritis complex in the commercial rabbit: A field study | Percy |
| Pathogenesis of selected viral infections of SCID mice | Percy |
| SDA: An important coronavirus infection in the rat | Percy |
| Identification and characterization of Haemophilus somnus immunogens with vaccine potential | Silva |
| Pathogenesis of bovine ocular squamous cell carcinoma | Stirtzinger, Livesey |
| Examination of the physiology and morphology of avian bone healing | Smith, Hunter |
| Molecular expression and regulation of the urea cycle in lower vertebrates | Wright |

## *Veterinary Microbiology and Immunology*

| Project Title | Researcher |
|---|---|
| The role of interferons and virus receptors in porcine transmissible gastroenteritis | Derbyshire |
| Development of an effective recombinant virus vaccine for transmissible gastroenteritis of swine. Part I | Derbyshire, Nagy |
| Rapid detection and characterization of verotoxigenic Escherichia coli in meats | Gyles |
| Verocytotoxins of porcine Escherichia coli | Gyles |
| Survey and control of Coxiellosis in dairy goats and dairy cattle | Lang |
| Development of an effective recombinant Actinobacillus pleuropneumoniae vaccine | MacInnes, Mallard, Rosendal |
| Molecular analysis of Actinobacillus pleuropneumoniae virulence factors | MacInnes, Rosendal |
| Effects of supplemental chromium on immune response and disease resistance in stressed feeder calves | Mallard |
| Evaluating bovine leukocyte antigens and other genetic markers to enhance immune response and disease resistance in Canadian holsteins | Mallard, Wilkie, Burnside |
| Role of serum resistance proteins in E. coli mastitis | Muckle |
| Protective immunity to Corynebacterium pseudotuberculosis in sheep and goats | Muckle, Menzies |
| Virulence and molecular epidemiology of infectious laryngotracheitis virus, a herpes virus of chickens | Nagy |
| Development of a multivalent recombinant fowlpox virus vaccine | Nagy, Derbyshire, Krell |
| Leptospiral abortion in swine | Prescott |
| The use of a vaccination program for the control of Q-fever | Prescott, Lang |
| Diagnosis and control of Mycoplasma hyorhinis disease | Rosendal |
| Feed conversion in pigs infected with toxin producing Pasteurella multocida in the lung | Rosendal |
| Improved diagnostic and prophylactic procedures for the control of pleuropneumonia in Ontario swine | Rosendal |
| Mycoplasma induction of tumor necrosis factor | Rosendal |
| Pathobiology of Mycoplasma iowae | Rosendal |
| Host immune response to chlamydia psittaci | Shewen |
| Host resistance to pasteurella haemolytica | Shewen |

| Project Title | Researcher |
|---|---|
| A DNA probe for diagnosis of bovine viral diarrhea by in situ hybridization | Thorsen |
| An investigation of various aspects of the transmission of caprine arthritis-encephalitis virus | Thorsen |
| Development and application of an improved serodiagnostic test for caprine arthritis encephalitis (CAE) | Thorsen |
| Control of salmonella contamination of poultry products by vaccination of breeder flocks | Wilkie |
| Genetic control of immune response and disease resistance in pigs. | Wilkie, Mallard |
| ***Clinical Studies*** | |
| Isolation of mycobacterium paratuberculosis in SCID mice | Butler |
| An investigation of disease, production efficiency, antimicrobial use & management systems on 6 white & 6 red veal farms in Ontario | Butler, Lumsden, Conlon |
| The pathogenesis of Johne's disease (Mycobacterium Paratuberculosis) in ruminants using SCID mouse as a model | Butler, Rosendal |
| External fixation: Strain, deformation and response at the bone/pin interface | Hurtig, Dobson, Miller |
| The creation of abdominal adhesions in the rabbit small intestine & the evaluation of high molecular weight dextrans, carboxy-methylcellulose & heperin for adhesion prevention | Livesey |
| An investigation into antibiotic excretion in milk following illness in dairy cows | Tremblay, Sandals, Conlon |
| Physiologic responses of calves to ACTH | Tremblay, Liptrap, Gentry |
| ***Population Medicine*** | |
| A software program for the management of health and productivity in an accelerated lambing system at the Ponsonby Research Station | Buckrell, Menzies, Walton |
| Embryo transfer and artificial insemination | Buckrell, Walton |
| The effects of pharmacological agents on mucociliary clearance in the horse | Clarke |
| Air quality and equine respiratory disease | Clarke |
| Relationship of production to reproductive performance in Canadian dairy cows - herd level and individual animal characteristics | Etherington, Schaeffer, Howard |
| Tiamulin hydrogen fumarate in feed at 220 ppm for 14 days for treatment of swine dysentry | Friendship |

| Project Title | Researcher |
|---|---|
| An evaluation of the efficacy of a germicidal post-milking teat-dip containing hydrogen peroxide, sodium linear alkylate sulfonate and lactic acid | Leslie |
| The effect of antibiotic therapy in nulliparous heifers on mastitis prevalence at calving & prevalence at calving & productivity in first lactation | Leslie |
| The evaluation of variable dosages of Tilmicosin for the treatment and/or control of induced S. aureus mastitis in non-lactating dairy cows. | Leslie |
| The role of teat-end preparation for dry cow treatment in the development of Nocardia mastitis | Leslie |
| The role of teat-end preparation for dry cow treatment in the development of Streptococcus uberis mastitis | Leslie |
| The evaluation of Tilmicosin for the treatment and/or control of subclinical mastitis in non-lactating dairy cows | Leslie, Barnum, Muckle |
| An evaluation of the safety and irritancy of two new base vehicle formulations for intrammary therapy | Leslie, Ewert |
| Studying the dynamics of bulk milk somatic cell count in milk from Ontario dairy herds | Leslie, Lissemore |
| A study of the association of growth in height, weight & pelvic size with reproductive performance, calving ease and productivity in Holstein heifers | Leslie, Meek |
| The use of Corynebacterium bovis as a teat organism in the evaluation of teat dip efficacy | Leslie, Sandals |
| Production and somatic cell count characteristics of Ontario dairy herds | Lissemore |
| The effect of method of administration on the efficacy of dry cow therapy | Lissemore, Leslie, Barnum |
| The determination of the cause of early embryonic death and the identification of factors associated with early embryonic death and litter size | Martin, Friendship Kennedy, Wilson |
| Development and implementation of an Ontario herd level IBR testing program | Martin, Lissemore |
| Development and implementation of an Ontario herd level dairy monitoring program designed to reduce drug use and potential residues by promoting health | Martin, Lissemore, Leslie, Bonnett |
| An epidemiologic and economic study of drug usage and residue occurrence in Ontario market hogs | McEwen, Meek, Black, Liefield, Howard |

| Project Title | Researcher |
|---|---|
| Cowside testing of milk for antibiotic residues: assessment of milk sampling methods | McEwen, Meek, Leslie, Black |
| An epidemiological investigation of undifferentiated bovine respiratory disease in large feedlot-pen conditions | Meek, Martin |
| Caseous lymphadenitis: prevalence in Ontario sheep and evaluation of an ELISA infection | Menzies, Muckle |
| Chlamydia psittaci: seroprevalence in Ontario sheep and its relationship to reproductive performance, neonatal survivability and management practices | Menzies, Waltner-Toews |
| Embryo transfer in swine | Metzger |
| Epidemiological evaluation of an Actinobacillus (Haemophilus) Pleuropneumoniae ELISA | Metzger, Wilson |
| Bacterial flora of the urethra in normal stallions | Samper |
| Field study on airsacculitis and cyanosis in male turkeys during winter | Vaillancourt |
| Contaminants in livestock production: A review | Waltner-Toews, McEwen |
| An observational study and survey to evaluate the prevalence and effects of Fusarial Mycotoxins on swine in Ontario | Wilson, Friendship Thorsen |

### *Fish*

| | |
|---|---|
| Pharmacokinetic studies of drugs and chemicals in fish | Black, Ferguson |
| Settled solids management land based rainbow trout culture | Chisholm |
| The effect of polyamines on growth and food consumption of rainbow trout | Cowey |
| The nutrition of Arctic Char | Cowey |
| The requirement for sulfur amino acids and their metabolism by young rainbow trout | Cowey |
| The utilization of stable forms of vitamin C by young rainbow trout | Cowey |
| Gill diseases of fish | Ferguson |
| Evaluation of metabolic processes occurring during accelerated growth in rainbow trout | Leatherland |
| Preparation of monoclonal antibodies to salmonid pituitary hormones for development of hormone assays | Leatherland |
| Genetic characterization of commercial rainbow trout stocks | McMillan |
| Use of triploidy induction in the improvement of rainbow trout production traits | McMillan |
| Rainbow trout spawning study | McMillan |
| Simulation of breeding programs in farmed salmonids | McMillan |
| Aquaculture statistics and industry evaluation for Ontario | Moccia |
| Manure characterization and disposal routes for aquaculture waste | Moccia |
| Semen evaluation and cryopreservation studies in salmonids | Moccia |
| Studies on the effects of Beta-agonists on intermediary metabolism and growth performance in rainbow trout | Moccia |
| The role of ethylamine and putrescine in overcoming soybean protein toxicity in rainbow trout | Smith |
| Fish species susceptibility to yersinia ruckeri | Stevenson |
| Gene probe for bacterial kidney disease of fish | Stevenson |
| Gene probe for enteric redmouth disease of fish | Stevenson |
| Gene probe for infectious pancreatic necrosis virus of fish | Stevenson, Dobos |
| The use of chemotherapeutics in the Ontario rainbow trout industry: present state and future concerns | Thorburn, Moccia |
| Dietary folate requirements of young rainbow trout | Woodward, Cowey, Niziol |

### *Sheep*

| | |
|---|---|
| Comparison of the effects of tail docking lambs by hot secateurs and by rubber rings | Duncan |
| The effect of rBST administration during the last trimester of gestation on mammary development in nulliparous sheep | Grieve |
| Effects of dietary protein & ß-agonists for ewe lambs on body composition, mammary development & milk production | Grieve |

## Engineering for Animal and Crop Production

| | |
|---|---|
| Development of an on-farm alfalfa separating (fractionating) unit | Bilanski |
| Heat–processing alfalfa while drying to increase its nitrogen availability to livestock | Bilanski |

| Project Title | Researcher |
|---|---|
| Efficient herbicide application technology | Brown |
| Conditioning and drying of new crops | Brown, Otten |
| Computer integrated farm management system — weather and chemical application | Brown, Hayward, James, Tollenaar |
| Hydrogen sulfide monitor for swine facilities | Hayward |
| Heat and moisture transfer through sprayed-on polyurethane insulation in high humidity environments | Jofriet, Otten |
| The study of bacterial movement through agricultural soils | Joy, Lee, Whiteley, Zelin |
| Movement of agricultural and domestic waste water bacteria through soils | Joy, Lee, Whiteley, Zelin |
| Mechanical properties of granular materials as related to forces in bulk storage structures | Negi |
| Air velocities in livestock buildings | Ogilvie |

## Field Crops

### *Cereals*

| | |
|---|---|
| Breeding improved cultivars of oats | Falk |
| Breeding improved cultivars of spring barley | Falk |
| Breeding improved cultivars of winter barley | Falk |
| Testing new improved varieties of cereals | Falk, Hunt |
| Cytogenetics of cereals | Falk, Hunt, Kasha |
| Haploid production and utilization in cereals | Falk, Hunt, Kasha |
| Triazoles as plant growth regulators and protectants | Fletcher |
| Production studies on barley and oats | Gamble |
| Breeding new and improved varieties of winter and spring wheats | Hunt |
| Development and evaluation of corn breeding techniques | Kannenberg |
| Development and improvement of corn breeding populations and inbreds | Kannenberg |
| Evaluation of corn hybrids | Kannenberg |
| Molecular approaches to gene identification, isolation and transformation in cereals | Kasha |
| Winterhardiness in cereals | McKersie |
| Co-ordination of cereal production research in Ontario | Stoskopf |

| Project Title | Researcher |
|---|---|
| Identification of the physiological factors that limit corn dry matter accumulation | Tollenaar |
| Effects of crop sequence on soil structure, stability and productivity | Vyn |
| Effects of hybrid selection and management on grain corn quality | Vyn |
| Effects of tillage systems and wheel traffic on soil structure and corn response | Vyn |

### *Forages*

| | |
|---|---|
| Development of DNA probes for the identification and quanitification of verticillium albo-atrum and verticillium dahliae in alfalfa | Boland, Nazar, Robb |
| Forage cultivar evaluation | Bowley |
| Winterhardiness of alfalfa | Bowley, McKersie |
| Population development of forage legumes | Bowley |
| Improvement of alfalfa quality | Bowley |
| Development and application of artificial seed technology in alfalfa | Bowley, McKersie |
| Methodologies for sampling large round bales | Burton, Clark |
| Improvement of forage quality through genetic engineering | Erickson |
| Seed production studies in forage and turf species | Gamble |
| Application of tissue culture and molecular biology to alfalfa improvement | Pauls |

### *Pulses and other crops*

| | |
|---|---|
| Spring rapeseed breeding and evaluation | Beversdorf, Hume |
| Winter canola breeding and genetics | Beversdorf, Hume |
| Effect of genotype and environment on quality aspects of soybeans and rapeseed | Beversdorf, Hume, Tanner |
| Seed vigour of soybean and fieldbean | Gamble |
| Improving soybean nitrogen fixation and production efficiency | Hume |
| Spring oilseed testing and management | Hume |
| Winter canola testing and management | Hume |
| Common bean breeding and genetics | Michaels |
| Development and utilization of biotechnology for oilseed crop improvement | Micheals, Pauls |
| Peanut breeding and genetics | Michaels, Tanner |
| Soybean breeding and evaluation | Tanner |

| Project Title | Researcher |
|---|---|
| **Horticultural Crops** | |
| ***Vegetables*** | |
| Carbon partitioning and plant environment interactions in greenhouse vegetable crops | Dixon, Grodzinski, Tsujita |
| Responses of vegetable crops to industrial pollutant stress | Hale-Marie, Ormrod |
| Physiological and biochemical mutants of nitrogen assimilation in the nodulated legume | Micheals, Shattuck, Shelp |
| Genetic improvement of pea via cell culture methods | Saxena |
| Incorporation of turnip mosaic virus resistance into rutabaga breeding | Shattuck |
| Evaluation of the nitrogen and boron nutrition of broccoli by analysis of transport fluid composition | Shelp |
| Improvement of nitrogen fixation potential in legumes | Shelp |
| Minituber seed potato production from in vitro plant materials | Souza-Machado |
| Stabilization and development of triazine resistant broccoli genotypes | Souza-Machado |
| Assessment of transposon mutagenesis for tagging genes in pea | Strommer |
| Genetic basis of ozone tolerance in pea | Strommer |
| Asparagus variety improvement and cultural practices | Wolyn |
| Breeding and evaluating potato varieties for Ontario | Yada |
| ***Tree fruits & small fruits*** | |
| Production techniques for tree fruits, particularly apple | Proctor |
| Raspberry breeding | Sullivan |
| Strawberry breeding | Sullivan |
| Strawberry management | Sullivan |
| ***Ornamentals*** | |
| Environmental influence on water status of greenhouse roses | Dixon |
| Plant–environment interactions in greenhouse roses | Dixon, Grodzinski, Murr, Tsujita |
| Physical, chemical & environmental parameters in container growing | Lumis |
| The influence of cultural practice on landscape trees | Lumis |
| Mass propagation of geranium via artificial seeds | Saxena |
| Effects of environmental stress on gene expression | Strommer |
| Recirculation nutrient solution systems and flower crop nutrition | Tsujita |
| **Pest Management and Disease Control** | |
| ***Weeds*** | |
| Biological control of weeds | Alex |
| Evaluation of new herbicide treatments for control of weeds in field crops | Anderson, Swanton |
| Physiology and biochemistry of herbicide selectivity in plants | Devine, Hall, Morrison, Stephenson |
| Induction of herbicide tolerance in plants with triazoles | Fletcher |
| Reduction of glyphosate rates for the control of broad–leaved trees in conifers | Fletcher |
| Immunochemical assays for the detection of herbicides in soil, water and plants | Hall |
| Influence of weeds and other stresses on natural toxins in crop plants | Sears, Stephenson |
| Integrated weed management systems for muck crops | Souza-Machado |
| Weed control in conservation tillage | Swanton |
| Integrated weed management in corn, soybeans and white beans | Swanton |
| ***Insect control*** | |
| Biology and control of insects affecting the production of forage and field crops | Ellis |
| Control of the onion maggot | Harris |
| Pesticides for minor crops | Harris |
| Biology of orchard insects | Laing |
| Biosystematics of decay-related diptera | Marshall |
| Physiological and behavioural studies on production and management of beneficial arthropods | Schmidt |
| Management of insect pests of potato | Sears |
| Pesticide exposure on applicator, agricultural workers and bystanders | Solomon |

| Project Title | Researcher |
|---|---|
| Arthropod & vertebrate pest control as related to livestock & poultry | Surgeoner |
| ***Plant disease control*** | |
| Biological control of weeds using fungi | Barron, Stephenson |
| Epidemiology and biological control of diseases caused by sclerotinia sclerotiorum | Boland |
| Molecular basis of plant-pathogen interactions | Goodwin |
| Biology and management of blackleg of rapeseed | Hall |
| Fungicide resistance of a plant pathogen, sclerotinia homoeocarpa | Hsiang |
| Initial investigation of particulate movement in porous media | Joy |
| Epidemiology and biocontrol of leaf scorch in strawberries | Sutton |
| Methods for applying biocontrol agents to strawberries for control of grey mold | Sutton |
| **Turfgrass** | |
| Nutrient requirements and response of turf to fertilizers | Bates |
| Competitive ability of turfgrasses | Eggens |
| Development of geographically based turf management software | Eggens |
| Turf renovation | Eggens |
| Turfgrass cultivar evaluation | Eggens |
| Performance and effects of ringer and other lawn amendments on turfgrasses | Eggens, Hsiang |
| Stress response of single and multiple cultivar populations of turfgrass species | Eggens, Hall, Hsiang |
| Turf microclimates in relation to water use and pest management | Gillespie |
| Chemical and non-chemical control of weeds in turf | Hall |
| Persistence of turfgrass pesticides in relation to human exposure | Hall, Solomon, Stephenson |
| Bioassay agents to detect fungicide residues in turfgrass soil | Hsiang |
| **Honey & Pollination** | |
| Biology and control of parasitic mites of honey bees | Otis, Scott-Dupree |
| Honey bee biology, management, and disease control | Otis, Scott-Dupree |
| Selective breeding of honey bees for resistance to parasitic mites | Szabo |
| **Food** | |
| Oxidative rancidity and flavour deterioration in meat products | Barbut |
| The use of MDPM in further processed products | Barbut |
| An investigation of seniors' food purchasing behaviour: market implications for the Canadian food system | Braga, Funk |
| Identifying consumers' concerns in the organic food industry in Ontario | Braga, Funk |
| A market and economic evaluation of merchandising aged and portioned-sized beef | Braga, Martin |
| Analyzing the costs and benefits of technical research | Braga, Van Vuuren |
| On-line sensors in processed food systems | Davidson |
| Automatic computer control and optimization of cyclone bioreactor system for acetic acid fermentation | Duitschaever |
| Formulation of milk and fermentation with strains of bifidobacterium and lactobacillus acidophilus | Duitschaever |
| Improving the organoleptic quality of irradiated food | Ferrier, Yada |
| Food components at subzero temperatures – the impact on food freezing and associated quality parameters | Goff |
| Utilization of milk proteins to improve the yield and quality of tofu | Hill |
| Assessment of trans fatty acids in Ontario foods | Holub |
| Evaluation of the fat composition and omega-3 fatty acid status of Ontario fish products | Holub |
| Acid degumming of soybean and canola oils | Kakuda |
| The role of native and bacterial proteases on age gelation of milk | Kakuda |
| Osmotic dehydration of strawberries and mushrooms | Le Maguer |
| Storage procedures for selected vegetable crops as potential import replacements | Lougheed |
| Storage and cultural techniques to extend the post harvest life of apples | Lougheed |

| Project Title | Researcher |
|---|---|
| Investigation of the hard-to-cook defect in Ontario white beans | Michaels, Stanley |
| Post-mortem technology coupled with re-structuring for low salt and fat processed meats | Mittal |
| Chill-injury in Ontario tomatoes | Murr, Stanley, Yada |
| Improvement of the quality of sprout damaged wheat flours | Rasper |
| Water-solubles as predictors of soft wheat quality | Rasper |
| An investigation of the major factors influencing the stability and quality of restructured meat products | Stanley |
| Factors regulating the processability of Ontario–grown potatoes | Yada |

## Pasture and Grazing Management

| | |
|---|---|
| Efficiencies of growing and finishing cattle of two frame sizes on differing forage/grain feeding programs | Allen, Ball, Buchanan–Smith, Wilton |
| Grazing response of forage mixtures | Buchanan–Smith, Clark |
| Production and reproduction of genotype–feeding combinations of fall–calving cows using rough-land pasture | Buchanan–Smith, Walton, Wilton |
| Production and reproduction of genotype–feeding program combinations of spring–calving cows on an intensively managed pasture | Buchanan–Smith, Walton, Wilton |
| Production and reproduction of genotype-feeding combinations of spring-calving cows using rough-land pasture | Buchanan–Smith, Walton, Wilton |
| Production and reproduction of genotype–feeding program combinations of spring–calving cows in a confinement system | Buchanan–Smith, Walton, Wilton |
| Cultivar by cultivar interactions between orchardgrass and white clover | Clark |
| Perennial grass legume pasture mixtures | Clark |
| Sward height in grazing management | Clark |

## Soil, Water and Waste Management

### *Agrometeorology*

| | |
|---|---|
| Forage quality as affected by atmospheric drying conditions and rainfall | Brown |
| Scheduling irrigation for optimum water use and yield of potatoes | Brown |
| Measurement and estimation of crop microclimates for pest management | Gillespie |
| Acquisition and compilation of agroclimatological data | Gillespie, King |
| Investigation of planetary boundary layer models to estimate regional-scale climates | Gillespie, Thurtell |
| Flux of greenhouse gases between agricultural surfaces and the atmosphere | King |
| Turbulent diffusion processes and trace gas detection | Thurtell |

### *Water Management in Agricultural Watersheds*

| | |
|---|---|
| Control of soil erosion and associated water pollution | Dickinson, Rudra |
| Toxicity of Margosan-0, a product of Neem, to selected aquatic invertebrates | Kaushik |
| Nitrate concentrations in shallow groundwater as influenced by application rates of nitrogen | Whiteley |
| Sources of contamination in outflow from tile drains | Whiteley |

### *Agricultural Resources — Inventory and Use*

| | |
|---|---|
| Developing a local land evaluation system | Brown, Taylor |
| Development of a rating system to evaluate agricultural land at the local level – phase II | Brown, Hilts, McBride |
| The economics of conservation tillage in southwestern Ontario | Fox |
| Development of a land rating index for agricultural performance in Ontario | Mage |
| Characterization of soil compaction and its agronomic significance | McBride |
| An evaluation of the economic viability of rehabilitating severely-eroded croplands | McBride, Stonehouse |
| Land evaluation for local agricultural land use | Penfold |
| Agricultural land preservation and horse farms | Penfold, Rodd |
| Socio–economic factors in local land rating | Penfold, Rodd |
| An evaluation of crop residue monitoring utilizing satellite data | Protz |
| Development of an index of soil quality | Protz |
| Implementation of landsat and spot satellite resource data into a microcomputer based county level geographic information system | Protz |
| Land rating for agriculture | Smit |

| Project Title | Researcher |
|---|---|
| Evaluation of Land Stewardship Program | Van Vuuren |
| Impact of farm tenancy on agricultural land use | Van Vuuren |
| Relationship between soil quality and land conversion cost | Van Vuuren |

### *Soil and Water Management for Crop Production*

| | |
|---|---|
| Development and evaluation of methods for prediction of macro/micronutrient requirements of crops | Bates |
| Use of sewage sludge on agricultural land with emphasis on plant availability of heavy metals | Bates |
| Manure N availability to corn | Beauchamp |
| Evaluation of a nitrogen soil test and the fate of fall applied N | Beauchamp, Kachanoski |
| Prevention of nitrate contamination of groundwater from fertilizer | Beauchamp, Elrick, Kachanoski |
| Modelling quality of surface and tile drainable water | Dickinson, Rudra |
| Field techniques for measuring the hydraulic properties of soils | Elrick |
| Evaluation of soil additives for erosion control | Groenevelt |
| Crop production & soil loss in variable topography | Kachanoski, Miller |
| Soil and crop management practices to enhance soil structural stability | Kay |
| Methods of application of fertilizer at planting for corn in conservation tillage systems | Miller |
| Field validation of the Guelph wind erosion assessment model | Nickling |
| Crop residue management and phytotoxin effects under conservation tillage | Voroney |
| Identification of soil management and cropping practices which sustain the capability of a soil to accept, cycle and store organic matter | Voroney |

## Farm Management, Production Economics, Resources Inputs

| | |
|---|---|
| Stewardship enhancement techniques for farm-level soil conservation | Blackburn, Hilts |
| A comparison of nearby and contract month basis values for corn, soybean and live cattle in Ontario | Braga |

| Project Title | Researcher |
|---|---|
| The economic implications of technical barriers in the pork sector | Braga, Goddard, Larue |
| Farm structure and performance in Canada | Brinkman |
| Manure N availability to corn | Beauchamp |
| Performance and competitiveness of the dairy industry | Brinkman |
| Human resource management on the farm | Brinkman, Howard |
| Management, behaviour and technology on Ontario swine farms | Brinkman, Howard, Martin |
| Management and behavioural characteristics of Ontario hog farms (Sub-project 2a) | Brinkman, Pletsch, Stonehouse |
| Systems analysis of pasture/cash crop rotations | Clark, Stonehouse, Wilton |
| Economics of technological change in the livestock sector | Fox |
| Agricultural production systems and environmental protection | Fox, Turvey, Weersink |
| The effectiveness of advertising milk in Ontario | Funk, Goddard |
| Economics of agroforestry in Ontario's tobacco belt | Gordon, Penfold, Stonehouse |
| The economics of mastitis control practices on Ontario dairies | Howard, Leslie, Meek |
| The impact of freer trade on the alcoholic beverage industry in Canada | Larue |
| The quantitative assessment of domestic and international trade policies | Meilke |
| Risk management in agriculture | Meilke, Turvey, Weersink |
| Production opportunities on non-prime lands | Smit |
| Technical and economic comparisons of alternative farming systems | Stonehouse, Swanton |
| Regulatory, efficiency and management issues affecting rural financial markets | Turvey |
| An evaluation of management, technology and economic performance of Ontario hog farms | Turvey, Weersink |
| Food processing in Canada: assessment of structure and competitiveness | Van Duren |
| Economic thresholds for weed densities in Ontario soybeans | Weersink |
| Performance and competitiveness of the dairy industry | Weersink |

# AGRICULTURE AND FOOD RESEARCH FUND

Initiated in 1986 to support innovative, high risk, non-traditional agriculture and food research, this five-year, $10-million program ($2 million per year) supported 88 projects in such areas as:

- plant and animal biotechnology; high technology monitoring and control of livestock facilities and crop storages;
- high technology application in food processing and packaging;
- market research to evaluate technology application, new products for Ontario farmers, and non-traditional markets for existing commodities.

A complete list of projects over the life of the program is available.

| Project Title | Researcher |
|---|---|
| Control of seed molds to improve quality of soybean seed - Part B | Anderson, Ag.Can., Harrow |
| Development of alfalfa for somatic seed hybrid production | Bowley, U of G |
| Automatic computer control and optimization of a cyclone bioreacter system for acetic acid fermentation | Duitschaever, U of G |
| Formulation of milk and fermentation with strains of bifidobacterium and lactobacillus acidophilus | Duitschaever, U of G |
| High linolenic acid eggs and their influence on blood lipids in humans | Ferrier, U of G |
| Chemical fingerprinting of fruits: detection of fraudulent activity in fresh and processed fruits | Fuleki, HRIO |
| Breeding strategies to exploit new biotechnologies in dairy cattle | Grieve, U of G |
| Evaluation and optimization of beef cattle breeding systems using multiple ovulation & embryo transfer | Grieve, U of G |
| Application of cell & tissue culture to the identification of genes conferring resistance to blackleg disease of rapeseed | Hall, U of G |
| Benefits of ultrafiltered milk for cheesemaking | Hill, U of G |
| Processes and formulations for new extrusion/baking technology | Holme, Griffith Lab. |
| A gene transfer system for the commercial mushroom | Horgen, U of T |
| Marcury Mark III - Automated field transplanters | Horlings, Marcury Enterprises |
| Coccidiosis vaccine through biotechnology: incorporation of the genes of Eimera Tenella into Eimeria Acervulina | Lee, Vetech Laboratories |
| Micro-perforated plastic packages for fruits and vegetables | Lougheed, U of G |
| An investigation to identify virulent strains of ureaplasma diversum and their components | Miller, U of G |
| Yield and winterhardiness of alfalfa on specialized drainage systems | Natho Jina, ACAFT |
| Application of growth promoting rhizobacteria for the improvement of the performance of potato in Ontario | Nowak, N.S. Ag. College |
| Development of biotechnological methods of embryo manipulation for advancement of the embryo transfer industry - Part I | Porter, U of G |
| Development of a vaccine to prevent boar taint and aggression in intact males | Redmond, VIDO Saskatoon |
| Development of DNA probes for the identification and quantification of verticillium albo-atrum & verticillium dahliae in alfalfa | Robb & Nazar, U of G |
| Control of seed molds to improve quality of soybean seed - Part A | Schaafsma, RCAT |
| Physiological and biochemical mutants of nitrogen assimilation in the nodulated legume | Shelp, U of G |
| Development of technology for modified atmosphere storage of Ontario-grown celery | Smith, HRIO |
| Modified atmosphere packaging biotechnology for fresh market strawberries | Smith, HRIO |
| Improved stress tolerance and agronomic traits of important potato varieties in Ontario | Thompson, Uof G |
| Development of a process for producing individually packaged honey products | Wang, HRIO |
| Modified atmosphere packaging (MAP) of minimally processed Ontario-grown vegetables | Wang, HRIO |

| Project Title | Researcher |
|---|---|
| Genetic control of immune response and disease resistance in pigs | Wilkie, U of G |

| Project Title | Researcher |
|---|---|
| Improving the organoleptic quality of irradiated food | Yada, U of G |

## FOOD SYSTEMS 2002 - PEST MANAGEMENT RESEARCH PROGRAM

Designed to reduce pesticide use while maintaining economic crop yields, sustainable farming,and effective pest control at moderate cost, this program began in 1988 and will continue until 1993. It will provide $3.9 million over five years for research in three main areas:

- non-chemical alternatives for pest control such as biological compounds, breeding for plant resistance, etc.;
- development of multi-faceted pest control systems;
- improvement of pesticide application technology and the disposal of pesticide containers and unusable chemicals.

A complete list of projects over the life of the program is available.

| Project Title | Researcher |
|---|---|
| Transgenic potato plants resistant to viruses: An alternative to reduce chemical pesticides for the control of insect vectors of potato viruses | Abouhaidar, U of T |
| Biological control of weeds in row crops | Alex, U of G |
| Exposure studies in the use of pesticides in greenhouse chrysanthemum production using fluorescent tracers & video imaging | Archibald, OMAF |
| Introduction & evaluation of anaphes sordidatus, parasitoid of carrot weevil eggs, in Ontario | Boivin, McGill U |
| Biological control of Sclerotinia Sclerotiorum with fungal viruses | Boland, U of G |
| Investigations on the chemical induction of disease resistance for the protection of transplanted vegetable crops from soilborne pathogens | Brammall, HES, Simcoe |
| The biology and control of perennial nightshade species in field & horticultural crops - Part A | Brown, RCAT |
| The biology and control of Perennial Nightshade species in field and horticultural crops | Cavers, U of WO |
| The fates of seeds produced by dicotyledenous weeds in herbicide evaluation plots | Cavers, U of WO |
| Assessment of the relationship between bacterial speck infestation of tomato transplant seedlings & disease incidence using a diagnostic DNA probe specific for the bacterial speck pathogen | Cuppels, Ag.Canada |
| Development and application of DNA probe for specific detection of common and fuscous blight bacteria in field bean seed | Dhanvantari, SWOARC |
| Develop monitoring methods for oviposition by corn rootworms in field corn and measure egg quality and overwintering | Ellis, U of G |

| Project Title | Researcher |
|---|---|
| Feasibility study on the control of slugs in commercial crops | Ellis, U of G |
| The importance and control of coleophora deauratella, a new pest of red clover grown for seed production | Ellis, U of G |
| Leaf removal studies on vinifera grapevines to reduce Botrytis Bunch Rot and improve fruit quality | Fisher, HRIO |
| Non-chemical alternatives to herbicides for weed control in turf | Hall, U of G |
| The integration of reduced levels of herbicide with tillage and crop rotation for the control and seed bank depletion of Velvetleaf and Nightshade | Hamill, SWOARC |
| Factors influencing the effectiveness of the onion pest management program in Ontario | Harris, U of G |
| Incidence and impact of necrotic ring spot and summer patch disease on turfgrass in southern Ontario | Hsiang, U of G |
| Organic and conventional crop production and reduced herbicide use | Hume, U of G |
| Development of control strategy for penicillium disease of cucumbers | Jarvis, Ag.Canada |
| Enhanced crop resistance to plant disease using bacterial inoculants | Lazarovits, SWOARC |
| Studies on the adaptability for survival of Verticillium dahliae microsclerotia and the effect of specific inhibitors and biological control agents on their longevity | Lazarovits, SWOARC |
| Evaluation of summer and winter cover crops for the control of root knot nematode on carrots | McDonald, HRIO |

| Project Title | Researcher |
|---|---|
| Investigations on the chemical induction of disease resistance for the protection of transplanted vegetable crops from soilborne pathogens | O'Sullivan, HRIO |
| Reduced rates of herbicides in sweet corn | O'Sullivan, HRIO |
| Weed control strategies for asparagus using fall-seeded rye | O'Sullivan, HES, Simcoe |
| Management of acaricide resistance in the European red mite panonychus ulmi (Koch) | Pree, Ag.Canada |
| Development of biological controls for foliar diseases of tomato, potato and ginseng | Reeleder, SWOARC |
| Development of an integrated biological and chemical control program for tobacco seedlings (greenhouse) diseases caused by Rhizoctonia and Pythium | Reeleder, Ontario Tobacco Research Advisory Council |
| Biological control of mushroom flies with entomopathogenic nematodes and microbial insecticides | Rinker, HRIO |
| Integrated disease management for verticillium disease of the cultivated commercial mushroom | Rinker, HRIO |
| Dissipation of ethylenebisdithiocarbamate & other fungicides on fresh grapes, pesticide residues in processed grape products | Ripley, OMAF |
| Evaluation of OMAF crop production recommendations for speciality crops with respect to pesticide application: Pre-harvest interval & maximum residue limits | Ripley, OMAF |
| Effects of leafhopper feeding and manual defoliation at various stages of drybean growth | Schaafsma, RCAT |
| New technology for insecticide placement to control soil insects in row crops at cultivation time | Schaafsma, RCAT |
| Validation of economic thresholds for potato leafhoppers on dry beans | Schaafsma, RCAT |
| Weed control recommendation system | Schleihauf, OMAF |
| Management of Colorado Potato Beetle and other pests of potatoes | Sears, U of G |
| Workshop on future directions of potato IPM in Ontario | Sears, U of G |
| The control of powdery mildew on Ontario-grown rutabagas | Shattuck, U of G |
| Biology and control of problem weeds | Shaw, RCAT |
| Identification of weeds and native plants as reservoir hosts for the tomato spotted wilt virus and the western flower thrips | Stobbs, Ag.Canada |
| Economics of low-input agriculture & alternative systems for the management of weeds in Ontario | Stonehouse, U of G |
| Health management in strawberries for high productivity of fungicide-free fruit | Sutton, U of G |
| Determination of the critical period of weed interference in corn (Zea Mays L.) and soybeans (Glycine Max L.) | Swanton, U of G |
| Crop weed models for corn and soybeans | Tollenaar, U of G |
| To determine the spray patterns of 80 degree and 110 degree spray nozzles under simulated field conditions | Underwood, RCAT |
| Evaluation of summer oils for integrated mite management on apples | Vaughn, Vaughn Agr. Res.Svces. |
| Monitoring and control of apple scab with minimal fungicide residues | Warner, Ag.Canada |
| Economic thresholds of weeds in soybeans and corn in Ontario | Weaver, SWOARC |
| To determine the effect of spidermite feeding on soybeans and develop better means of control | Whitfield, SWOARC |

## LAND STEWARDSHIP RESEARCH PROGRAM

Begun in 1987, this program was designed to expand the current base of knowledge to assist farmers in the adoption of cost effective soil conservation practices. $2.25 million was provided over three years for 21 projects at eight different Ontario research institutions. Areas of research dealt with were:

- practical, cost effective stewardship systems;
- options for marginal and lowland areas;
- ditchbank stabilization;
- windbreaks and shelterbelts.

A complete list of projects over the life of the program is available.

| Project Title | Researcher |
|---|---|
| Improving the degraded structure of a clay loam soil with deep tillage & grass & legume crops | Curnoe, KCAT |
| Agroforestry research and development | Gordon, U of G |
| Crop rotations & cover crop effects on erosion control, tomato yields & soil properties in southwestern Ontario | Johnston, RCAT |
| Nitrogen conserving farm systems | Kachanoski, U of G |
| A cover cropping strategy for first early potato production | McKeown, HRIO |
| Agroforestry research in Ontario | Nanni, RCAT |
| To investigate the establishment, subsequent growth and erosion control potential of certain tree & shrub species on gully and stream banks | Skepasts, NLCAT |

| Project Title | Researcher |
|---|---|
| Crop rotation effects on crop yields and soil properties in southwestern Ontario | Stevenson, RCAT |
| Impact of soil compaction on the production of processing vegetables and other cash crops | Stevenson, RCAT |
| Management of fine textured poorly drained soils for intensive agriculture | Stone, Ag.Canada |
| Response of the soil microflora and fauna to spring plowing of zerotill and pasture soils | Thomas, U of G |
| Cropping and soil management effects on the dynamics of crop residue derived-N on the coarse textured soils in southern Ontario | Voroney, U of G |
| Improving the degraded structure of fine textured soils with deep tillage and grass and legume crops | Weil, ACAFT |

## ONTARIO FOOD PROCESSING RESEARCH FUND

As part of the Food Processing Development Strategy launched by the Ontario Ministry of Agriculture and Food (OMAF), a competitive Food Processing Research Fund was established in 1991, with the following basic objectives:

- to maintain and increase the ability of Ontario processors to capitalize on production research and development
- to ensure that research and development efforts are responsive to the needs of the Ontario food processing industry
- to encourage commercial development of new opportunities where the Ontario food industry is not yet established.

The Ontario Food Processing Research Fund consists of $5 million over a five-year period and will be administered by OMAF under the auspices of the Agricultural Research Institute of Ontario. The projects approved are targeted at one of four broad areas:

- automated processing and grading technologies
- microbial safety
- technologies for improving shelf-life and quality
- new value-added products.

| Project Title | Researcher |
|---|---|
| Continuous food manufacturing process control for multi-unit operations in parallel, contained in a single-line process | Bell, Farmatic Research |
| Ultrasound image enhancement techniques for estimation of meat quality and yield in beef cattle | Brown, U of G |
| Controlled atmosphere storage and modified atmosphere packaging of Ontario grown pears | Chu, HRIO |
| Flour performance in frozen dough breads | Chudyk, HRIO |
| Microbial safety of modified atmosphere packaged (MAP), minimally processed Ontario-grown vegetables | Dodds, Health & Welfare Canada |
| Computer automated greenhouse environmental control based on direct measurement of plant response | Dixon, U of G |

| Project Title | Researcher |
|---|---|
| The influence of high N-3 fatty acid eggs on blood lipids and platelet fatty acids in humans | Ferrier, U of G |
| Automation of pork grading in processing of hogs | Goldenberg, Engineering Services Inc. |
| Rapid assessment of the quality of poultry carcasses | Griffiths, U of G |
| Electric pulse process for the pasteurization of liquid foods - Part II | Hill, U of G |
| Canlac lactulose from whey products | Kabel, Ault Foods |
| Electroporation process for pasteurization of liquid foods- Part 1 | Mittal, U of G |
| Project cavena | Re, UFL Foods Inc. |

| Project Title | Researcher |
|---|---|
| New milling technology for Ontario wheats | Sadaranganey, Robin Hood Multi-foods |
| Development of organic processing techniques for herbs and spices | Wang, HRIO |

## ONTARIO PORK INDUSTRY IMPROVEMENT PLAN RESEARCH PROGRAM

This $5.5 million program began in 1986 to improve the competitive position of Ontario pork producers and to identify new knowledge and technologies that will improve the production and processing of pork. This is its final year.

This program supported 49 projects and addressed needs in the following areas:

- swine artificial insemination;
- mycotoxins in corn;
- economically important swine diseases;
- pork quality;
- pale soft exudative (PSE) pork;
- the effects of environmental influences on pork production and pork quality.

A complete list of projects over the life of the program is available.

| Project Title | Researcher |
|---|---|
| Ear mold resistance in Ontario corn hybrids | Bolton, Ag.Canada |
| Knowledge-based decision support software for natural ventilation of livestock housing, Version 2 | Choiniere, ACAFT |
| The investigation of the transient nature of hazardous conditions in swine barns due to manure gases released | Clarke, KCAT |
| Development & application of techniques to improve the quality of frozen boar semen | Fisher, Ag.Canada |
| The incidence of PSE pork in the four major Ontario plants & the influence of conditions in these plants on the incidence of PSE | Fortin, Ag.Canada |
| The influence of farm conditions on the development of PSE in pork | Fortin, Ag. Canada |
| An investigation of seasonal infertility of swine in Ontario | Friendship, U of G |
| Mycotoxin testing | Hough, Ont.Corn Producers Assoc. |
| Genetic improvement of swine through optimum use of Ontario genetic resources | Kemp, OMAF |
| The determination of the cause of early embryonic death & the identification of factors associated with early embryonic death & litter size | Martin, U of G |
| Rapid method for assessment of maize ear rot resistance | Miller, Ag.Canada |
| Detection of Ontario pigs which are prone to the production of PSE pork | Murray, Ag.Canada |
| Development of monoclonal antibodies for detection of antibody in porcine sera | Nielson, Ag.Canada |
| Dietary undetermined anion - practical application in the management of pork quality (PSE) and heat stress in swine | Patience, U of Saskatchewan |
| The possible involvement of relaxin in porcine hypogalactia | Porter, U of G |
| Development of a subunit vaccine for haemophilus pleuropneumonia - part II | Potter, VIDO, U of Saskatchewan |
| An evaluation of management, technology & economic performance of Ontario hog farms | Stonehouse, U of G |
| The development of a screening method and vehicle for tolerance, resistance to pink ear mould in corn hybrids | Schaafsma, RCAT |
| Development of rapid diagnostic tests for identifying mycotoxins & evaluation of suspected interactions | Trenholm, Ag.Canada |
| To evaluate the Ontario Pork Industry Improvement Plan | White, Inforesults |
| An observational study & survey to evaluate the prevalence & effects of fusarial mycotoxins on swine in Ontario | Wilson, U of G |

## RED MEAT II RESEARCH PROGRAM

This program began in 1989 and will continue until 1994. It provides $ 1.1 million per year and over the life of the program will allot $4 million to beef research, $1 million to sheep research, and $500,000 to goat research.

In the beef area, focus is on respiratory diseases, productivity and genetic improvement. Sheep research emphasizes pasture improvement, artificial insemination, and diseases of sheep. Goat research covers Caprine Arthritis Encephalitis (CAE) diagnostic test development, and the establishment of a Goat Herd Improvement Program.

To date 49 projects have been funded. A complete list of projects over the life of the program is available.

| Project Title | Researcher |
|---|---|
| Meat quality | Ball, U of G |
| Project Title ResearcherReproductive efficiency, feedlot performance, carcass composition and meat quality from prolific and standard breeds of sheep | Ball, U of G |
| A study to design improved systems for monitoring drug residues in slaughtered animals | Black, U of G |
| Investigation into effects of toxins on disease resistance in cattle: development of scid-bovine mouse, a murine model for evaluating the toxicity of terbufos & T-2 mycotoxin on bovine immune function | Boermans, U of G |
| Influence of feeding forage on beef quality | Buchanan-Smith, U of G |
| Development and evaluation of a software program for the management of sheep under accelerated breeding program in Ontario | Buckrell, U of G |
| Further study into the development and application of a commercial AI program for Ontario sheep producers | Buckrell, U of G |
| An investigation of disease, production efficiency, anti-microbial use and management systems on six white and six red veal farms in Ontario | Butler, U of G |
| Development of an infrastructure for information gathering on management, health and productivity of meat goats and ROP for genetic evaluation | Burnside, U of G |
| Pathogenesis of Johne's disease, mycobacterium paratuberculosis (MPTB) in ruminants using the severe combined immunodeficient (SCID) mouse model | Butler, U of G |
| Clarification of species listeria monocytogenes & its separation for other listerias of no health hazard by electrophoretic and cultural methods | Clark, U of T |
| Impact of chemotherapeutic agents and aquacultural pollutants on fish assessment using immune response in gills | Ferguson, U of G |
| Development of economic merit indices for efficient beef production | Grieve, U of G, Kemp, OMAF |
| Organoleptic inspection methodology of edible animal products: A literature review | Gullett, U of G |
| Sensory evaluation | Gullett, U of G |
| Rapid detection of vertoxigenic escherichia coli in meats & characterization of vertoxigenic escherichia coli associated with beef | Gyles, U of G |
| Studies on bovine pasteurellosis: part B: A study of mechanisms by which pasteurella haemolytica cytotoxin induces contractions of bovine airway muscle | Harris, U of G |
| Evaluation of the composition and textural properties of white veal, red veal and beef | Johnson, Drevjany, KCAT |
| Development of genetic evaluation procedures for the Ontario sheep flock improvement program | Kemp, OMAF |
| Haemophilus somnus immunogens & bovine GM-CSF: A new non-antibiotic approach to disease resistance in meat producing species | Little, U of G |
| To establish a sheep research centre for developing improved techniques of artificial insemination and embryo transfer | Manten, United Breeders Inc. |
| Classifying undifferentiated bovine respiratory disease (UBRD), and identifying its important causes under field conditions | Martin, U of G |
| Pasture management systems for sheep production | McBride, U of G |
| Caseous lymphadenitis: prevalence in Ontario sheep and evaluation of an ELISA to detect infection | Menzies, U of G |
| Chlamydia psittaci: seroprevalence in Ontario sheep & relationship to reproductive performance, neonatal survivability and management practices | Menzies, U of G |

| Project Title | Researcher |
|---|---|
| Influence of ureaplasma diversum on bovine embryonic development and mortality | Miller, U of G |
| Development of criteria for accelerated beef processing & evaluation of methods of determining & describing beef product quality | Mittal, Barbut, U of G |
| GTF chromium for stressed feeder calves | Mowat, U of G |
| Meat goat improvement program | Robinson, OMAF |
| Forage systems and pasture management for sheep production | Sharpe, NLCAT |
| Reproductive efficiency, feedlot performance and carcass composition of feedlot lambs of prolific and standard breeds | Sharpe, NLCAT |
| Investigation of the immune response of sheep to chlamydia psittaci, the cause of enzootic ovine abortion | Shewen, U of G |

| Project Title | Researcher |
|---|---|
| Studies on bovine pasteurellosis: part A: Evaluation of immunity in young calves to the respiratory pathogen pasteurella haemolytica A1 | Shewen, U of G |
| A DNA probe for diagnosis of bovine viral diarrhea by in situ hybridization | Thorsen, U of G |
| An investigation of various aspects of the transmission of caprine arthritis-encephalitis virus | Thorsen, U of G |
| Development & application of an improved serodiagnostic test for caprine-arthritis encephalitis (CAE) | Thorsen, U of G |
| The use of chemotherapeutics in the Ontario rainbow trout industry: present & future concerns | Thorburn, U of G |
| Contaminants in livestock production: a review | Waltner-Toews, U of G |
| Evaluation for product quality in the Ontario bull test program | Wilton, U of G |

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## UNIVERSITY OF GUELPH - EQUINE RESEARCH PROGRAM

The Equine Research Program at the University of Guelph is dedicated to the horse industry's research and information needs. The Equine Research Centre (ERC) acts as the focal point in the program for researchers from across the University campus, sponsors and the equine industry. Founding partners and operating support of the Centre include the Ontario Ministry of Agriculture and Food, the Ontario Racing Commission, The E.P. Taylor Equine Research Fund and the University of Guelph. Considerable support also comes from individuals and organizations within the equine industry. The Equine Research Program is based on the expertise and facilities at the

ERC, Ontario Veterinary College, the Ontario Agricultural College and other campus research expertise, equipment, library and resources. Interdisciplinary research projects make best use of the broad range of expertise and facilities. Collaborative research projects and commercial sponsorship with other national and international institutes, funding bodies and companies are also being fostered.

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